ABSTRACT BIBLIOGRAPHY OF THE CHEMISTRY AND TECHNOLOGY OF PEANUTS, 1830 - 1939

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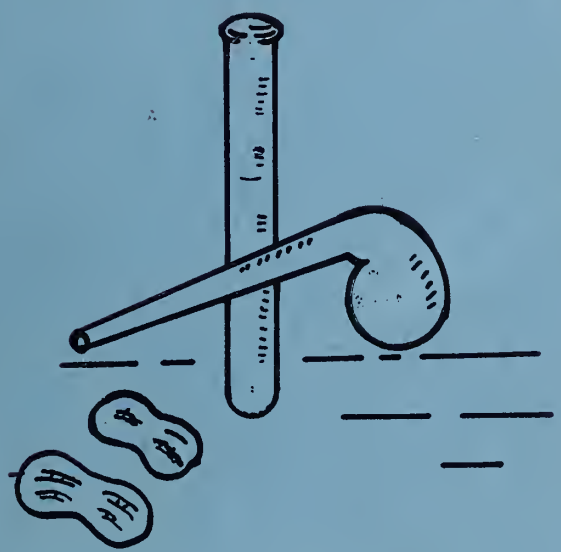

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FOREWORD

This bibliography is a compilation of references and abstracts relating to the chemistry and technology of the peanut, Arachis hypogaea, and its derived products, including peanut butter, peanut oil, and peanut cake or meal. It covers the period 1830 to 1939. The references and abstracts have been arranged alphabetically by author under each subject division listed in the table of contents. Subject and author indexes are also provided.

The sources of these references and abstracts are as follows:

Chemisches Zentralblatt, 1830-1881
Journal of the Chemical Society, Abstracts, 1876-1910
Chemical Abstracts, 1907-1939

The complete titles of the journals which are referred to in the present bibliography in abbreviated form may be found in the List of Periodicals Abstracted by Chemical Abstracts published by the American Chemical Society, Columbus, Ohio, 1946.

If the original articles cited herein are not available through your nearest library, microfilms or photoprints of most of these publications may be obtained from the Library of the U. S. Department of Agriculture, Washington 25, D. C., at a flat charge of 50 cents for microfilms of any single article from any single volume of a periodical, or 50 cents for photoprints of each 5 pages or fraction thereof from any single volume.

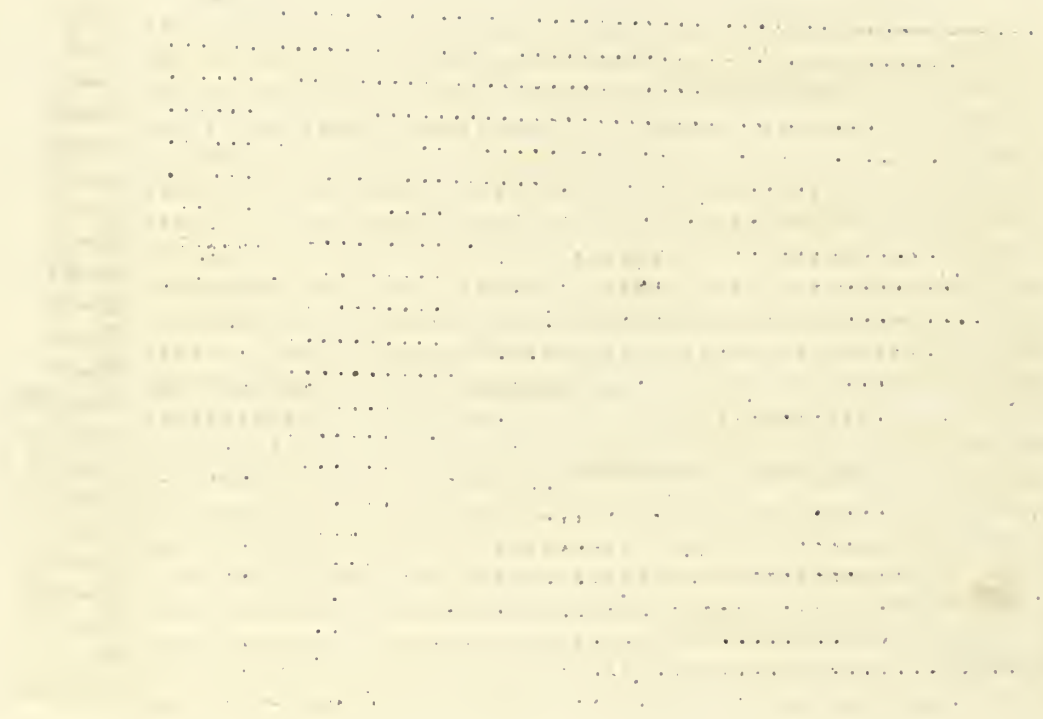
General information on peanuts can be found in Miscellaneous Publication No. 416 entitled "Marketing Peanuts and Peanut Products" by Henry J. Clay, Bureau of Agricultural Economics, U. S. Department of Agriculture, 1941.

Agricultural Economics Bibliography No. 80, entitled "The Peanut Industry", Bureau of Agricultural Economics, U. S. Department of Agriculture, Washington, D. C., 1939, provides reference literature on the economic aspects of the peanut industry (1920-39).

The literature on the chemical composition of peanuts has been reviewed by J. D. Guthrie, C. L. Hoffpauir, M. F. Stansbury, and W. A. Reeves in a processed publication No. AIC-61, entitled "Survey of the Chemical Composition of Cotton Fibers, Cottonseed, Peanuts, and Sweetpotatoes, A Literature Review", Southern Regional Research Laboratory, Bureau of Agricultural and Industrial Chemistry, U. S. Department of Agriculture, 1949.

We wish to acknowledge the helpful advice of Dr. K. S. Markley and Dorothy B. Skau and the assistance rendered by the Mail, File, and Service Section for typing, processing, and assembling this bibliography.

C O N T E N T S



PEANUTS

Agronomy

Allison, R. V.

THE IMPORTANCE OF CERTAIN SPECIAL ELEMENTS IN THE AGRICULTURE OF SOUTH FLORIDA.

Proc. Fla. State Hort. Soc. 1931, 11-21, 163-7; C.A. 28, 4819. (1934).

A discussion is given of the effects of the sulfates of Cu, Mn and Zn on the growth, development and yield of various plants in the Everglades region. Much better yield and quality of peanuts were obtained by combined applications of $CuSO_4$ and $ZnSO_4$ than by the use of either compd. alone. K. D. Jacob

Arasimovich, V. V., Artemieva, M. N. and Pavlova, N. A.

THE INFLUENCE OF THE CONDITIONS OF IRRIGATION ON THE QUALITY OF OIL-BEARING PLANTS.

Bull. Applied Botany, Genetics Plant Breeding (U.S.S.R.), Ser III, No. 12, 191-226 (1935); C.A. 30, 6038 (1936).

Under certain systems of irrigation the quantity of oil in peanuts, soybeans and sesame increased. There was no difference with flaxseed. In general, irrigation increased the I number in soybeans and flaxseed. No difference in this respect was noted in the other plants. In all cases the protein content decreased. J. S. Joffe

Batten, E. T. and Poos, F. W.

SPRAYING AND DUSTING TO CONTROL THE POTATO LEAFHOPPER ON PEANUTS IN VIRGINIA.

Virginia Agr. Expt. Sta., Bull. 316, 3-26 (1938); C.A. 32, 7197 (1938).

The potato leafhopper, Empoasca fabae Harris, was best controlled by 3 applications of 4-4-50 Bordeaux mixt. as a spray, or by 3 applications of fine S dust at 21-day intervals beginning about July 10. C. R. Fellers

Bieberdorf, Frederick Wilhelm

THE CYTOLOGY AND HISTOLOGY OF THE ROOT NODULES OF SOME LEGUMINOSAE.

J. Am. Soc. Agron. 30, 375-89 (1938); C.A. 32, 5867 (1938).

A report is given of the comparative cytological and histological development of nodules of soybean (Soja max Pieper), cowpea (Vigna sinensis Endl.), sweet clover (Melilotus alba Dsr.), alfalfa (Medicago sativa L.), vetch (Vicia villosa Roth), and peanut (Arachis hypogaea). The nodule-forming bacteria enter the host plant by the aid of an infection strand, usually through the root hairs. It is also possible for bacteria to enter the host plant through ordinary epidermal cells. Vascular bundles, composed of xylem surrounded by phloem, are formed in the nodule, surrounding the bacteroidal cells and connecting with the xylem and phloem of the root. New xylem is continuously added to the vascular bundles of the soybean and cowpea. In the soybean, but not in the cowpea, alfalfa, sweet clover and vetch nodules, a layer of sclerenchyma cells surrounding the bacteroidal and vascular tissues develops which limits the growth of the nodule. Starch grains are plentiful in the unifected cells in the bacteroidal tissue and around the vascular bundles. J. R. Adams

Burkhart, Leland

NITROGEN NUTRITION AND METABOLISM OF ETIOLATED SEEDLINGS.
Plant Physiol. 13, 265-93 (1938); C.A. 32, 8475[1](1938); cf. C.A. 28, 4709[2].

Seedlings of pumpkin (I), peanut (II), white lupine (III) and yellow lupine (IV) were grown in nutrient solns. with and without $(NH_4)_2SO_4$ added. The seedlings were fractionated into stems, cotyledons and roots for analyses which were made at suitable intervals until the plants showed carbohydrate-deficiency symptoms. The rate of absorption and utilization was most rapid in I. The oily reserve was rapidly converted into sugars, but no starch was formed and rapid depletion of sugars was assocd. with NH_4 utilization and protein formation. In II the oil reserve was rapidly converted into sugar which was converted into starch in the cotyledons and primary roots. In III and IV NH_4 was readily utilized during the early stages of growth. In all seedlings during the early stages of growth, NH_4 was readily absorbed and protein synthesis occurred. In the intermediate stages, when available carbohydrates are less plentiful, NH_4 is absorbed and utilized but proteins are broken down and amides accumulate. During the carbohydrate starvation period NH_4 is not absorbed, proteins and amides are broken down and NH_4 accumulates. Sixty-four references.

Duggar, J. F.

NODULE NUMBERS ON LEGUMES AS AFFECTED BY FERTILIZATION.
Ala. Agr. Expt. Sta., 43rd Ann. Rept. 1932, 28-9; C.A. 28, 7406[8] (1934).

When fertilizer was placed in contact with the seed of Spanish peanuts at the time of planting, nodule nos. were reduced, especially during the early life of the seedlings. There was a high degree of correlation between the dry wt. of nuts per plant and the av. no. of nodules on the roots 49 days before harvest. Superphosphate and S stimulated nodulation in lespedeza whereas $Ca(OH)_2$, and basic slag were of doubtful advantage.

Duggar, J. F.

NODULATION OF PEANUT PLANTS AS AFFECTED BY VARIETY, SHELLING OF SEED AND DISINFECTION OF SEED.
J. Am. Soc. Agron. 27, 286-8(1935); C. A. 29, 5214[3] (1935).

Soaking unhulled seed peanuts, not artificially inoculated, in various disinfectants tended, with most chemicals, to reduce nodule nos. and germination.

Duggar, J. F.

NODULE NUMBERS AND YIELDS OF SPANISH PEANUT PLANTS AS AFFECTED BY INOCULATION.
Ala. Agr. Expt. Sta., 44th Ann. Rept. 31-2 (1933); C. A. 29, 5581[5] (1935); cf. C. A. 28, 7406[8]; 29, 5214[3].

Artificial inoculation of unhulled seed peanuts with pure cultures of peanut invariably resulted in large increases in av. no. of both total and large nodules per plant. Inoculation increased crop yields from 27 to 33%. Basic slag phosphate reduced increased nos. of nodules when used as a fertilizer. Superphosphate, KCl and $Ca(OH)_2$ when added to the soil in normal amts. and not in direct contact with the unhulled peanuts also increased nodulation of the plants.

Ferris, E. B.

PEANUTS.
Miss. Sta., Bull. 130; C.A. 4, 2167 (1910).

This is a popular bull. on the cultivation and use of peanuts. Analyses of the diff. parts of the plant are given. WmP. Garrety

Guidotti, Rolando

AGRICULTURAL STUDIES ON THE GIUBA VALLEY (ITALIAN SOMALILAND).
Agr. coloniale 26, 525-49, 592-8 (1932); 27, 5-28 (1933); C. A. 27, 2237 (1933).

In this economic study on the possibilities of this new Italian colony, some analytical data are given on the soils, production, etc. The water of the Giuba River has a total hardness of 11-12° and dry residue 0.16-0.25 g. per l.; the soils are about neutral and contain H_2O 2.9-9.75, org. matter 2.54-10.05, $CaCO_3$ 1.3-13.6, N 0.98-1.68, P_2O_5 0.46-2.11, K_2O 7.78-10.97, Cl 0.023-0.16%. Results are given on the cultures of mangrove (Rhizophora mucronata, contg. 40.2-42.18% tannin in the bark), castor oil plants, tobacco (Maryland variety, which is rich in nicotine), red pepper, peanuts (the seeds contain 35.16% oil), etc. G. A. Bravo

Jodidi, Samuel L.

PRELIMINARY BIOCHEMICAL STUDIES ON EFFECTS OF CERTAIN ENVIRONMENTAL FACTORS ON DEVELOPMENT AND COMPOSITION OF THE PEANUT.
J. Agr. Research 57, 301-11 (1938); C. A. 32, 9373 (1938).

The ash content of 6 samples of peanut fruits taken from soil-treatment plots of an exptl. field appeared to be decreased in both kernels and shells by a high N supply of the soil or by Bordeaux-mixt. treatment that resulted in a marked increase of plant growth and yield of pods. The ether ext. of the kernels showed relatively unimportant differences, but in the shells the percentage of ether-extractable substances was decreased by high N or by Bordeaux treatment. The total N content of kernels and shells was not influenced by a high N condition of the soil. Differences in crude fiber were very small. Reducing-sugar content was extremely low in all samples of kernels. The sucrose contents of kernels from the high N and Bordeaux-treated plots were not materially different from their corresponding checks. Total polysaccharides and total carbohydrates appeared to be decreased somewhat on the high-N plot and increased on the Bordeaux-treated plot. W. H. Ross.

Malhotra, R. C.

A PHYSICOCHEMICAL STUDY OF SOME ECONOMIC SEEDS DURING GERMINATION WITH PARTICULAR REFERENCE TO WEIGHT AND ENERGY LOSSES.
Protoplasma 12, 167-89 (1931); C. A. 26, 2215 (1932).

Castor-oil, beans, corn, sunflower, peas, Marquis wheat, flax, hemp, Windsor bean, cotton and peanut seeds were germinated in Petri dishes contg. tap water for 8 days. Data were obtained with respect to loss of wt., oil or fat and caloric energy during germination. The respiratory quotients were also detd. Oily seeds had the max. and starchy seeds the min. caloric energy before germination. There was correlation between max. oil and energy. The total heat energy lost during germination is most in starchy, least in oily and medium in proteinaceous seeds. The respiratory quotient is lowest in oily seeds, highest in starchy seeds and medium in proteinaceous seeds. M. H. Soule

Mann, H. B.

INFLUENCE OF CERTAIN DUSTS AND SPRAYS UPON THE GROWTH, YIELD, QUALITY AND GENERAL CHARACTERISTICS OF PEANUTS
N. Car. Agr. Expt. Sta. 46th Ann. Rept. 41-3 (1935); C. A. 30, 564 (1936).

Pot expts. showed that the addn. of S to the soil at the rate of 94 lb. per acre made the foliage a bright green color and hastened maturity in peanuts. The S increased the soil acidity an av. of 1.4 pH. $CaSO_4$ increased the soil acidity only 0.5 pH; $CaCO_3$ decreased it by 1.1 pH. The rate of application of the $CaSO_4$ and $CaCO_3$ was 400 lb. per acre. S was decidedly injurious to the foliage and to yield. $CaSO_4$ and Bordeaux mixt. were ineffective. $CaCO_3$ gave greatly increased nodulation $CaSO_4$ decreased nodulation. C. R. Fellers.

Mann, H. B.

THE RELATION OF SOIL TREATMENT TO THE NODULATION OF PEANUTS
Soil Sci. 40, 423-37 (1935); C. A. 30, 3144 (1936).

$CaCO_3$ applied at the rate of 2000 lb. per acre in pot expts. with virgin Norfolk sandy loam (pH 5.3) and with virgin Coxville fine sandy loam (pH 4.5) increased nodulation of peanuts throughout the growing season. Similar treatment of cultivated Norfolk sandy loam previously limed to pH 6.6 did not increase nodulation. $CaSO_4$ (2000 lb. per acre) delayed and reduced nodulation in all 3 soils. S (400 lb. per acre) prevented nodulation at all stages of plant growth. Combined applications of $CaCO_3$ and S or $CaCO_3$ and $CaSO_4$ had little effect except that with $CaSO_4$ and $CaCO_3$ the nodulation was usually increased at maturity. The growth of the plants, as measured by dry wt., could not be directly correlated with nodulation. Varying applications of $CaCO_3$ up to 16,000 lb. per acre on virgin Norfolk and Coxville soils produced different effects upon nodulation. Many more nodules were produced on the Coxville soil, but the response to liming was similar on both soils. The heavy applications of $CaCO_3$ retarded and reduced nodulation. These results offer an explanation for the conflicting reports concerning the effect of lime upon legume nodulation. Eighteen references. John D. Hardesty

Mazzari, Carlo

PEANUT CULTURE IN THE DRAINAGE SOILS OF GENALE (ITALIAN SOMALILAND). Agr. coloniale (Italy) 31, 273-81, 322-37, 378-85 (1937); C. A. 32, 1379 (1938).

Agricultural and statistical data are given. The soils are of alluvial origin, of gray or red-brown color, and contain H_2O (at 105-110°) 5.31-9.10, org. matter 4.61-7.01, $CaCO_3$ 14.29-24.51, sand 41.01-62.29, N 0.98-1.12, P_2O_5 sol. in strong acids 0.96-1.44, K_2O sol. in strong acids. 6.86-10.76%. G. A. Bravo.

Miege, M.

EXPERIMENTS ON OIL-BEARING PLANTS IN MOROCCO DURING 1926-7
Bull. mat. grasses inst. colonial Marseille 1929, 257-67; C. A. 24, 1532 (1930).

Agricultural data obtained at the exptl. farms with regard to flaxseed, peanuts and mustard seed are given. E.S.

Moharmad, Ali, Alam, Zafar and Khanna, Kidar L.

GERMINATION AND GROWTH IN GROUNDNUT (ARACHIS HYPOGAEA LINN.).
Agr. Live-stock India 3, 91-115 (1933); C. A. 27, 4618 (1933).

Addn. of kankar (a mineral material consisting of small nodules composed principally of the carbonates and sulfates of Ca, with smaller proportions of the Mg, Na, K, Fe and Al salts) greatly improved the growth of the roots and plants of peanuts and the development of the root nodules in a clay soil. A similar improvement was obtained by the application of slaked lime in amt. equiv. to 411 lb. CaO per acre. Plots treated with $(NH_4)_2SO_4$ (82.3 lb./acre) made poorer growth of plants and roots than the controls. Application of lime induced early flowering, and the greater portion of the flowers was formed in the early stages of plant growth, whereas with $(NH_4)_2SO_4$ the greatest no. of flowers was produced in the later stages of growth. K. D. Jacob.

Moore, J. H. and Rankin, W. H.

INFLUENCE OF "RUST" ON QUALITY AND YIELD OF COTTON AND THE RELATION OF POTASH APPLICATIONS TO CONTROL
N. Carolina Agr. Expt. Sta., Bull. 308, 4-18 (1937); C. A. 32, 2272 (1938).

Rust injury to cotton plants and fiber occurs on cotton-peanut rotations usually where there is a lack of K in the soil. The addn. of 50-100 lb. of KCl per acre gave greatly improved yield and quality of cotton. There may be factors other than K involved in "rust" disease of cotton. Fiber strength of "rusted" cotton is lower than normal. C. R. Fellers

Moore, Rufus H.

NUTRITIONAL LEVELS IN THE PEANUT PLANT
Botan. Gaz. 98, 464-90 (1937); C. A. 31, 3527 (1937).

Five series of peanut plants were grown in sand cultures varying from high to low N nutrition and from low to high conditions of C assimilation. Both extremes were weakly vegetative and nonfruitful. The greatest vegetative extension and fruitfulness occurred in the same cultural treatment. From the highest N to the highest carbohydrates series the percentages of dry matter and total carbohydrates increased the percentages of sol. salts and total N decreased. The root fractions increased in percentage of sol. solids. Hemicelluloses were not correlated with levels of nutrition. The high carbohydrate condition favored a slightly greater percentage of ether ext. in the seeds and gynophores, the suppression of rancidity in the seeds and the development of marginal hairs on the leaflets. The fruiting tendency was less sensitive to nutritional changes in the peanut than in the tomato. The concn. of the phosphate ion in the nutrient soln. must be reduced to avoid injury when the plant is grown in the light. J.T.S.

Poos, F. W. and Batten, E. T.

GREATLY INCREASED YIELDS OF PEANUTS OBTAINED IN ATTEMPTS TO CONTROL POTATO LEAFHOPPER.

J. Econ. Entomol. 30, 561 (1937); C. A. 31, 7578 (1937).

Expts. made to control Empoasca fabae on peanuts gave evidence of marked increase of yield with both Bordeaux mixt. (4:4:50) and S which could not be ascribed to leaf hopper control. The treated plants remained green and thrifty until first whereas untreated plants matured early in October. Probably some type of plant stimulation was involved. The study is being continued. C. H. Richardson.

Prescott, J. A.

SOME CHARACTERISTICS OF SOILS USED FOR THE CULTIVATION OF PEANUTS (ARACHIS) IN THE NORTHERN TERRITORY OF AUSTRALIA.

J. Council Sci. Ind. Research 11, 261-5 (1938).: C.A. 33, 795 (1939).

The favored soils are on the sandy alluvium in the vicinity of the Daly and Katherine rivers. The soils are light textured, brown in color and reasonably fertile. At the Daly River K_2O in the surface soils ranges from 0.144 to 0.252% and P_2O_5, 0.019 to 0.045% while at the Katherine River the corresponding figures are 0.252% to 0.502% and 0.021 to 0.045%. The P_2O_5 content suggests a probable response to phosphatic fertilizers. Soils suitable for peanut cultivation show characteristic mech. analysis. J. R. Adams

Rajagopalan, T.

GROUNDNUT NODULE ORGANISM. I. ISOLATION OF STRAINS AND STUDY OF CULTURES.

Indian J. Agr. Sci. 8, 331-48 (1938): C. A. 32, 9147 (1938).

Isolates of nodule organisms from 6 varieties of ground nut were alike morphologically but fell into 2 distinct physiol. strains. The characteristics of one strain were high gum production, high sensitivity to H ions, high ferment power, high N fixation and production of large nos. of small and medium sized nodules which were concd. more on the tap root than on the laterals. The other strain showed the reverse characteristics. The efficiency of the strains in fixing N appeared to depend more on the location of the nodules than on their no. and size.

II. LIFE CYCLE OF THE ORGANISM.

Ibid. 349-55.

Under anaerobic conditions, banded rods occurred in abundance in all the media and the motility was more persistent in solid media and in nutrient broth than in other cultures. In partial pressure cultures, the banded rod stage also predominated throughout the entire period of observation in nearly all the media, except nutrient broth media, solid and liquid, wherein this stage appeared and continued throughout from the 6th day onward.

III. PHYSIOLOGY OF THE ORGANISM: FERMENTATION CHARACTERISTICS.
Ibid. 357-77.

The organism attacked all the carbohydrates tried, including dextrin, and produced the same final H-ion concn. in all the cultures at the end of 1 month. Glucose was attacked the most and lactose the least readily. Fermentation of glucose depended to a large extent on the concn. of the sugar, the presence of buffer salt (K_2HPO_4), peptone, nitrate, $CaCO_3$ and the initial reaction of the medium. The fermenting power of the organism was very high during its earlier stages of growth and subsequently diminished rapidly with advance in age of the culture.

IV. PHYSIOLOGY OF THE ORGANISM: INTERMEDIARY METABOLISM.
Ibid. 379-402.

The products detected and detd. in the fermentation of glucose Ashby's medium by the organism were AcOH, EtOH, traces of aldehyde, lactic acid, tartaric acid and CO_2. When it was grown in glucose Ashby's nitrate medium, of the total C utilized by the organism 21% appeared as CO_2, 14% in the cells and the balance as by-products other than CO_2. The N content of the bacterial cells increased with the age of the culture with decreasing C:N ratios. The bacterial cells of the organism in Ashby's mannite-agar medium contained gelatinase, Catalase, deaminase, carboxylase, tyrosinase, urease, oxidase, peroxidase and various sugar-splitting enzymes. The increase in NH_3 in peptone cultures of the organism was usually assocd. with a corresponding decrease in amino acids. In nitrate cultures, the organism attacked the nitrate without a quant. corresponding increase in the org. and ammoniacal N at any period of analysis.

Sellschop, Jacq. P. F. and Salmon, S.C.
THE INFLUENCE OF CHILLING, ABOVE THE FREEZING POINT, ON CERTAIN CROP PLANTS.
J. Agr. Research 37, 315-38 (1928); C. A. 23, 1460 (1929).

Exposure at 0.05-5.0 for 24 hrs. was fatal to rice, velvet beans and cotton. A no. of other crops showed injury of various kinds, but potatoes, tomatoes, buckwheat, soybeans and flax were uninjured by chilling for 96 hrs. Cowpeas, peanuts, maize and velvet beans were more severely injured by chilling when growing in wet than in dry soil. The presence of $NaNO_3$ in the soil soln. was fatal when some plants were chilled, whereas only moderate injury was obtained without it. On the other hand, the presence of KNO_3 protected them from injury. K ions assisted plants to withstand injury; Ca ions were without effect or slightly injurious and Na ions were decidedly deleterious when the plants were chilled.

Sibuya, Tunetosi

RESPONSES OF SEEDS TO THE HORMONE TREATMENT GIVING VERNALIZATION-LIKE EFFECTS

J. Sec. Trop. Agr., Taihoku Imp. Univ. 10, 264-9 (1938); C. A. 33, 8239 (1939).

When cottonseeds and peanuts were soaked directly in β-indoleacetic acid soln. or after sprouting, earlier flowering and an increase in flowers were observed. This phenomenon resembled those of the Cholodny's vernalization (C. A. 31, 5837, 6281). When the seeds were treated for a short time with dil. soln., a favorable effect was obtained. Y. Kihara.

Woodroof, Naomi C. and Higgins, B. B.

DUSTING SPANISH PEANUTS WITH SULFUR

Georgia Agr. Expt. Sta., Circ. 117, 12 pp. (1939); C. A. 33, 7474 (1939).

S dust acts as both a fungicide and insecticide. Three applications of S dust of 12-20 lb. each per acre gave good control of leafspot (Cercospora arachidicola) and certain insects. The dusted peanut hay showed a higher protein and lower content of crude fiber than control plot peanut hay. The use of S releases certain soil minerals such as K which is an added advantage of its use. C.F.Fellers

Anonymous

OFFICIAL METHODS ADOPTED BY THE CHEMISTS COMMITTEE AND THE RULES COMMITTEE OF THE COTTONSEED CRUSHERS' ASSOCIATION OF GEORGIA.
Proc. Ga. Cotton Seed Crushers' Assoc. 16, 120-34 (1920); Expt. Sta. Record 45, 719; C. A. 16, 3220 (1922).

Methods are included for the analysis of cottonseed hulls, cake, and meal; crude cottonseed, peanut, coconut, and soy-bean oils; refined oils; and soap stock and acidulated soap stock. H. G.

Anonymous

IMPROVEMENT OF NIGERIAN GROUND NUTS.
Bull. Imp. Inst. 19, 132-40 (1921); C. A. 16, 1329 (1922).

Three series of nuts of the Chinese, Gambia, Zaria, Erect, Hausa, Ayaya and Mache Atagune varieties were examd. and compared with results of earlier expts. The av. wt. of single kernels varied from 0.41 to 0.78 g., moisture (drying at 100°) from 5.1 to 9.9%, yield of oil from kernels as received 41.6 to 48.8% and acid value of oil from 0.28 to 3.70%. The yield of oil from nuts taken from plants attacked severely by the tikka disease (Cerospora personata) was no less than that from nuts obtained from healthy plants. The yield of oil was somewhat less than is usual for West African Kernels. R. L. Sibley.

Anonymous

GROUNDNUTS FROM SOUTH AND EAST AFRICA.
Bull. Imp. Inst. 31, 150-160 (1933); C. A. 27, 5122 (1933).

Samples from Southern Rhodesia, Union of South Africa and Tanganyika had normal characteristics. A. Papineau-Couture

Ahmad, Bashir and Mc Collum, E. V.

COBALT CONTENT OF SOME FOOD MATERIALS FROM DIFFERENT PARTS OF THE UNITED STATES.
Am. J. Hyg. 29A, 24-6 (1939).: C. A. 33, 3009 (1939).

Considerable variation exists in the Co content of different food materials. On the whole, beans and peas are richer in Co than corn and wheat. The values varied from 0.018 to 0.0475 mg./100 g. dried material and from 0.014 to 0.042 for beans and corn, resp., and from 0.006 to 0.008 mg. for the cereals with 3 exceptions. No correlation can be made between the Co content of foods and their geographical sources according to states. The greatest consistency in Co content was found in yellow corn. Data are also presented for milk powder, peanuts, pecans and pancreas. The estns. of Co were made on soln. prepd. from the ash colorimetrically with nitroso R salt reagent. It was not necessary to remove Fe and Cu from any samples except pancreas. Rachel Brown

Banks, H. P.

SAMPLING OF ORIENTAL OIL CAKES, ETC.

J. Oil & Fat Ind. 1, 63-5 (1924); C. A. 20, 1914 (1926).

Cart-wheel soy-bean and linseed cakes should be sampled by boring into them several times with a 1" bit, bag-cake and with a sampler drawing from 5% of the sacks. Hair, which is often present from the press cloth used in pressing the cakes, should be noted when samples are taken as its presence is detrimental to the quality. Fish meal due to its great variation should be sampled by a trier from 20% of the bags care being taken to get a core from top to bottom. Chinese shelled peanuts are best sampled by opening 5% of the bags and taking hand samples both from the middle and edges of the sacks. H. S. B.

Bertrand, Gabriel and Benzon, Boje

THE ZINC CONTENT OF FOOD VEGETABLES.

Compt. rend. 187, 1098-1101; Compt. rend. acad. agr. France 14, 1303-7 (1928); C. A. 23, 1696 (1929).

Zn plays an important physiol. role, comparable to that of Fe, in living organisms. The Zn content of different plants as well as different parts of the same plant is extremely variable. E.g., peach mesocarp or beet leaves contained from 0 to 0.2 mg. per kg., bean seeds and pine nuts approx. 50, and hemp seed 82. In general there is less than 1 mg. per kg. of Zn in the pulpy portion of peaches, plums, apricots, mandarin oranges, strawberries, melons and in etiolated leaves; from 1 to 2 mg. per kg. in parenchymous roots such as carrot, turnip, radish, the flesh of orange, lemon juice, leaves of low chlorophyll content such as escarole, cabbage, romaine, in figs, raisins and chestnut; 2 to 3 mg. per kg. in celery, banana, cauliflower, salsify, sweet potato, tomato, and Jerusalem artichoke; 3 to 4 mg. per kg. in rutabaga, asparagus, Japanese artichoke, date and forage beet. As the chlorophyll content increases, the Zn increases also. In carrot leaves and alfalfa, 4 mg.; radish leaves, 4.5; head lettuce, 4.7; cress, 5.6; spinach, 6.2; dandelions, 9.7; matured white potato 4; mushrooms, 5.1-5.3; truffles, 2.8; yeast, 12.4; garlic, 10; onion, 13.1 in the water tissues and 50 in the seeds. In the grains, barley, sorghum, wheat, millet and rye contain 12-19 mg.; soy beans, 20; vetch, 23; lentils, 24.5; peas, 44.5; beans, 52.5; buckwheat, coconut and fresh almonds, 10; peanuts, 16; sunflower seed, 17; dried almonds, 18; dried nuts, 20; pine nuts, 55; hemp seed, 82.6; polished rice, 2; rice bran, 30; white wheat flour, 6-7; whole wheat flour, 10-15. C.R.F.

Bertrand, Gabriel and Benzon, Boje

THE ZINC CONTENT OF THE CHIEF VEGETABLE FOODS.

Bull. soc. hyg. aliment. 16, 457-63 (1928); C. A. 23, 2505 (1929); cf. C. A. 23, 1696

Zn was detd. in a large no. of food products on 200-1500 g. samples by the Ca zincate method (cf. B., Compt., rend. 115, 939, 1028(1892) B. and Javillier, Bull. soc. chim. (4), 1, 63 (1906); B and Vokragnatz, C. A. 18, 363). With coconut "milk" only 82 g. was available, and no Zn was detected. The following results were obtained, expressed in mg. per kg. on the fresh material, on the dry basis and on the ash, resp.:***; whole peanut seeds (Arac. hyp. L.) 16.0,16.8,780;***. Many other foodstuff analyses are given. See abstract for comparative data. A.Papineau-Couture

Bouffil, Pierre

INVESTIGATION OF PEANUTS FROM THE IVORY COAST.

Bull. mat. grasses inst. colonial Marseille 21, 133-7 (1937); C. A. 32, 3846 (1938).

A summary is presented of the analysis of 36 different peanut samples from various parts of the Ivory Coast (Haute-Cote) carried out in 1935. The greater the yearly rainfall, the heavier are the shells. The oil content of the samples as received varied from 40.5-52.25%, with only 1/3 of the samples contg. less than 45%, or based on the dry wt. 49%. Detailed figures are given for 6 samples, these varied as follows: H_2O 7.33-10.87, oil on dry sample 49.51-54.23, cellulosic matter 1.36-2.43, N-contg. material 2.97-3.65 and total proteins 18.59-22.8%. J. A. Szilard

Brown, William S.

ANALYSIS OF THE ASH OF THE GROUND PEA (ARACHIS HYPOGAEA) AS CULTIVATED IN VIRGINIA.

Chem. News, XXXIV, 147-149; B. A. 1877, i 225.

In 100 parts of pure ash, excluding ferric oxide, which the authors believe to be an accidental impurity, there were found:

	Root	Stem	Leaves	Husk	Seed
K_2O	23.043	25.902	15.880	37.395	37.134
Na_2O	18.816	3.063	2.897	3.763	3.342
CaO	28.180	43.440	53.712	20.145	3.749
MgO	8.706	13.296	4.844	13.506	14.262
P_2O_5	3.684	1.590	4.679	5.062	29.102
SO_3	13.015	10.613	15.235	17.749	11.742
Cl	1.162	1.501	2.533	0.486	0.346
SiO_2	3.705	0.933	0.791	2.003	0.401
	100.261	100.338	100.571	100.109	100.078
Deduct O eq. to Cl	0.261	0.338	0.571	0.109	0.078
	100.000	100.000	100.000	100.000	100.000

In the dried plant the ash is as follows:

Root	Stem	Leaves	Husk	Seed
11.830	13.288	7.747	2.586	1.818

Oil = 47.34 percent
Nitrogen = 3.415 percent W.R.

Brown, L. P.

PEA-NUT.

Exper. Stat. Record, 3, No. 1,(1891); B. A. 1892, 1122.

The yield of pea-nuts in the United States amounted to 2,700,000 bushels in 1889, and was still greater in 1890. Two kinds are cultivated, the white and the red; the latter ripen better because earlier. The following tables show (1) the precentage composition of nuts grown in Tennessee, and (2) the percentage composition of the ash:

	Water per-cent.	Per cent. in dry substance. Protein	Crude fat	Non-nitrogenous extract.	Crude fibre	Crude ash
Pea-nut kernels (1888)	3.87	28.65	49.35	17.23	2.37	2.40
" " (1889)	4.86	27.07	48.60	19.30	2.52	2.51
" meal	10.64	49.63	6.33	31.67	6.06	6.31
" hulls (1).....	8.81	6.42	1.34	17.14	73.07	2.03
" " (2).....	7.81	7.94	2.17	13.36	65.81	3.63
" hay	7.83	11.75	1.84	46.95	22.11	17.04

	P_2O_5	K_2O	Na_2O	CaO	MgO	SO_3	SiO_2
Kernels	38.90	39.85	2.85	4.11	1.83	10.40	0.20
Hulls	5.63	31.78	7.85	27.01	12.60	8.89	4.13
Leaves	4.85	15.00	7.26	50.77	10.89	3.57	5.60
Stalks	5.34	19.23	7.52	25.80	19.67	7.42	9.93

Good crops can only be obtained with carefully selected seeds, well tilled soil, and careful treatment of the plants. The peanut belongs to the richest of all known foods, the meal being equal to cotton-seed meal, but the hulls have only a slight manurial value. Pea-nut hay is a nutritious food, and is a very suitable substitute for clover hay, especially for cattle. According to experiments in Virginia and North Carolina, a moderate amount of artificial manures and farmyard manure seem to be profitable; a manure containing about 15 lbs. of nitrogen, 10 lbs of soluble phosphoric acid, and 20 lbs. of potash per acre might be tried. N. H. M.

Division of Chemistry

ANALYSES OF RHODESIAN FOODSTUFFS.

Rhodesia Agr. J. 36, 537-45 (1937); C. A. 32, 1339 (1938).

Detns. of moisture, ash, crude protein, ether ext., fiber, carbohydrates and nutritive ratios made during the past few years are reported for the following Rhodesian foodstuffs: 21 kinds of grains and seeds, 15 miscellaneous concentrates, 3 slaughter-house by-products, 16 kinds of leguminous pods and seeds, the pods, husks, kernels of 2 kinds of ground nuts, the seeds and pods of 14 kinds of beans, 27 kinds of hay from grasses, 14 kinds of hay from legumes, 16 kinds of miscellaneous dried roughage from leaves of trees, plants, etc., 7 kinds of roughage from roots, tubers and fruits and 15 kinds of silage. Colin W. Whittaker.

Emmerling, A.

EARTH-NUT MEAL.

Biod. Centr., 20, 606-607; B. A. 1892, 92.

The author has already called attention to the adulteration of food with the husks of earth-nuts. Attempts are now being made to introduce the latter, in the form of meal, as a food. The commercial product is a dirty-yellow powder with a slightly bitter taste, and contains sand. It is prepared from the outer covering of the earth-nut, but contains portions of the skin of the seeds. The analysis of six samples gave the following results:

	Water	Ash	Crude protein	Crude fibre	Carbo-hydrates	Crude fat
Minimum	7.26	3.83	7.64	48.87	15.88	3.46
Average	7.95	10.15	8.23	53.66	16.33	4.11
Maximum	8.58	14.31	8.97	58.96	16.85	5.65

The digestibility of the proteids was determined in two samples;

Total proteids per cent	Digestibility per cent	Coefficient of digestibility per cent
7.87	4.20	53.3
8.66	4.01	46.3

The name given to the meal is misleading, as it denotes the skin of the seed, whereas it is prepared mainly from the outer covering, the nutritive value and digestibility of which is less than that of the skin. N.H.M.

Fielding, W. L. and Rose, M. F.

REPORT OF THE COTTON EXPERIMENT STATION, BARBERTON, S. AFRICA. ROTATION CROPS. Repts.

Empire Cotton Growing Corpn., Expt. Stations 1932-33, 83-100 (1934); C. A. 29, 2378 (1935).

Samples of the Yellow 1 variety of soybeans grown in S. Africa contained H_2O 7.8-8.7, crude protein 36.5-40.0, oil 17.0-18.3, crude fiber 4.8-5.1, carbohydrates 24.5-26.6 and ash 4.8-4.9%. Kernels of the Barberton strain of peanuts contained H_2O 5.4 and oil 48.4%; the extd. oil contained 0.05% free fat acids (expressed as oleic acid) and had an acid value of 0.1. The B. 4 and St. 3 strains of sunflower seed grown in S. Africa contained H_2O 6.7, 6.8; crude protein 14.0, 18.4; oil 24.6, 26.0; carbohydrates 20.9, 18.7; crude fiber 31.9, 28.0 and ash 1.9, 2.6% resp. K. D. Jacob.

Fraps, G. S.

THE COMPOSITION OF PEANUTS AND PEANUT BY-PRODUCTS.

Texas Agr. Expt. Sta., Bull. 222, p. 38 (1917); C. A. 12, 2031 (1918)

An average of 5 lots of peanut hay showed it to contain 9.9% protein, 24% crude fiber, 42.7% N-free ext. and 10% ash. It has a higher productive value than alfalfa but less digestible protein. Whole Texas peanuts average 25.5% protein and 36.6% fat. Texas grown peanuts are richer in protein than those grown in Eastern U. S. Peanut hulls are high in fiber and have no feeding value. Peanut kernels are rich in protein and fat. The mineral constituents of peanut hay were found to be 0.39% P_2O_5, 1.3% K_2O, 1.76% Ca, 1.04% Mg and 4.4% insol.

ash. The kernels contain 0.803% P_2O_5, 0.82% K_2O, 0.11% Ca, 0.34% Mg and 0.088% insol. ash. The peanut hulls contain 0.15% P_2O_5, 1.16% K_2O, 0.31% Ca, 0.25% Mg, and 1.79% insol. ash, 0.737% starch and 17.8% pentosans. Peanuts are shown to be a good human food, containing an ediole oil. The yield of oil and cake are discussed and methods are given for calcg. the hull content of peanut by-products from the fiber content and for the calculation of the whole pressed peanuts from a sample of peanuts of known analysis.
J. J. Skinner

Griebel, C. and Maass, H.

SERO-DIAGNOSIS IN FOODSTUFF INVESTIGATIONS.

Z. Untersuch. Lebensm. 63, 166-76 (1932); C. A. 26, 5348 (1932).

Sp. antisera were obtained by the procedure of Uhlenhuth for hazelnut, peanut, anacardium (cashew nut) and pine seeds, but not for walnut. Sp. antisera were also secured for almonds and apricot stones, but it was not possible to distinguish between them. The antisera were successfully applied for detection of hazelnuts, pine and anacardium seeds in marzipan and persipan, as well as for that of finely ground almonds and hazelnuts in chocolates. By means of a plasmon (casein-Na compd.)-antiserum 1% of plasmon could be detected in sausages. S. Laufer

Haupt, H.; Bautzen

DETECTION OF PEANUTS IN PASTRY.

Pharm. Zentralhalle, 51,1119-21; C.A. 5, 1129 (1911).

Detection of peanuts as substitute for almonds in baked foods was found not very easy. Microscopical recognition is made difficult because only the cotyledons of the seeds are used and their cellular structure is damaged in baking. Refraction test of the oil extracted from the suspected goods with Et_2O in a Soxhlet failed on account of other fats which are employed in preparing the seeds for use in pastry. The natural fat also suffers changes in baking. M. p. detns. of the arachidic acid, according to Bellier, was tried with unsatisfactory results, some of the results being higher than 60°. Lastly, again the microscopic exam. was resorted to but with the view of finding starch grains which the peanuts contain in small numbers, the almond seeds being free from them. The sample is first extracted with H_2O to remove sugar, then with ether-alc. and some 1% I in KI soln. is added. With this almond seeds turn brown while the peanut seeds show black specks. A slide is prepared and examined under a microscope. The starch grains are mostly large (6-12μ) and are readily recognizable, being colored blue. A. V.

Hirano, I. and Mikumo, R.

COPPER IN THE LEGUMES.

J. Pharm. Soc. Japan No. 525, 992-4(1925); C. A. 20, 616 (1926).

The Cu content of various legumes and its distribution between seed coat and embryo were estd. by a colorimetric method after the sample is ashed and the Cu is converted to the NH_4-Cu complex. The results are given in mg. of Cu in 1 kg. of dried samples as follows: soy bean 15.896; Phaseolus mungo L. (var. subtilibata, Fr. and Sav.) 5.855; green peas 2.687; red peas 5.291; Vicia faba L. 8.024; black beans 12.156, Phaseolus vulgaris L. 6.183, "toramame" 6.183; peanut 6.778; and "sodefuri mame" 2.051. The seed coats contain 30-40% of the total Cu in legumes. S.T.

Hirst, E. L. and Jones, J. K. N.

PECTIC SUBSTANCES. I. THE ARABAN AND PECTIC ACID OF THE PEANUT.
J. Chem. Soc. 1938, 496-505; C. A. 32, 5382 (1938).

Peanuts (Arachis hypogaea) were freed from oil by pressing and extn. with boiling EtOH and from protein with 10% NaCl; they were then extd. with boiling 0.2% aq. KOH for 4 hrs. and the ext. pptd. with MeOH, giving from 6 kg. seeds 77 g. of an arabanpectic acid complex (I). Extn. of the residue with boiling 5% KOH gives 75 g. starch fraction, and leaves about 200 g. cellulose. I is a white powder, which is sol. in dil. alkali, giving viscous solns. It gives no color with I or with ZnCl$_2$I. Hot concd. alkali causes decompn., with formation of deep orange products. I has $(\alpha)_D^{20^\circ}$ 120° (neutral Na salt in H_2O, c 1.5); furfural yield 31.7%; uronic acid content 45.8%; thus the calcd. araban (II) content is 40.5%. Hydrolysis of I by boiling an aq. soln. for 20 hrs. gives 33% of a Ba polygalacturonate and l-arabinose, the yield of the diphenylhydrazone of which corresponds to 40% II. Hydrolysis of I with 1% HCl at 90° for 3 hrs. gives a pectic acid, $(\alpha)_D^{20^\circ}$ 224° (Na salt in H_2O). Total hydrolysis with 3% H_2SO_4 at 90° for 30 hrs. gives arabinose corresponding to 40% II and galacturonic acid. Part of the II can be isolated by extg. I with 70% EtOH at 20°. Methylation of I could not be effected by the usual methods. However, the Tl deriv. reacts with MeI; the methylated product was sepd. into 2 fractions by Et_2O; the Et_2O-insol. fraction was further methylated with MeI and Ag_2O and fractionally pptd. from $CHCl_3$ by petr. ether; further methylation and extn. with Me_2CO gives a methylated II and a methylated pectic acid (to be described later). The methylated II (3.2 g. from 6 kg. seeds) is cream colored, $(\alpha)_D^{20^\circ}$ - 90° (MeOH, c 1.76). Hydrolysis with MeOH-HCl gives approx. equimol. proportions of 2,3,5-trimethyl- (III), 2,3-dimethyl- (IV) and 3-methyl-methyl-l-arabinoside (V). III b/0.001 87-90°, $n_D^{16.5^\circ}$ 1.4362 $(\alpha)_D^{21}$ 60° (H_2O, c 0.6); the structure of III follows from the conversion into, 2,3,5-trimethyl-l-arabinose, 2,3,5-trimethyl-γ-l-arabonolactone and 2,3,5-trimethyl-l-arabonamide. IV b/0.01 115-22°, $n_D^{16.5^\circ}$ 1.4522, $(\alpha)_D^{21^\circ}$ 14° (H_2O, c 0.4); hydrolysis with 0.1 N HCl gives 2,3-dimethyl-l-arabinose, $n_D^{17^\circ}$ 1.4650, $(\alpha)_D^{20^\circ}$ 106° (equil. value, H_2O, c 2.4); Br-H_2O gives 2,3-dimethyl-γ-l-arabonolactone, b/0.003 145-55°, n_D^{17} 1.4605, $(\alpha)_D^{20^\circ}$ - 34° (H_2O, c 0.7), changing to - 19° in 330 hrs.; amide, m. 16°, $(\alpha)_D^{20^\circ}$ 17° (H_2O, c 2). V has $n_D^{16^\circ}$ 1.4710, $(\alpha)_D^{21^\circ}$ 46° (H_2O, c 0.47); hydrolysis gives 3-methyl-l-arabinose, $n_D^{16^\circ}$ 1.4850 $(\alpha)_D^{20^\circ}$ 96° (equil. value, H_2O, c 2.3); oxidation gives the lactone, b/0.003 175°, $n_D^{17^\circ}$ 1.4800, $(\alpha)_D^{20^\circ}$ -36° (H_2O), changing to -19° in 160 hrs.; amide, glassy solid, $(\alpha)_D^{20^\circ}$ 31° (H_2O, c 1.1). The structure of II is discussed. C.J. West

Hirst, E. L. and Jones, J. K. N.

PECTIC SUBSTANCES. II. ISOLATION OF AN ARABAN FROM THE CARBOHYDRATE CONSTITUENTS OF THE PEANUT.
J. Chem. Soc. 1939, 452-3; cf. C. A. 32, 5382; C. A. 33, 4203-(1939).

The pectic acid-araban complex (60 g., $(\alpha)_D^{20^\circ}$ 79°) from the carbohydrate portion of the peanut (part I), shaken at room temp. with 70% EtOH for 8 weeks, the filtrate neutralized with 0.1 N NaOH, evapd. to dryness and the brown hygroscopic solid extd. with C_5H_5N contg. 2% H_2O, followed by acetylation, gives 1.2 g. araban acetate, $(\alpha)_D^{20^\circ}$ - 90° (Me_2CO, c 0.74). Deacetylation with N NaOH (heating 5 hrs) gives araban, $(\alpha)_D^{21^\circ}$ - 160° (H_2O, c 1.44); it is a hygroscopic powder readily sol. in H_2O. Hydrolysis with 0.05 N HCl at 95° gives a quant.

yield of l-arabinose; the rate of hydrolysis indicates the presence of arabofuranose residues in the polysaccharide. The importance of this isolation of an araban of definite purity and known properties is discussed in relation to the widespread occurrence of arabans in nature.

III. COMPOSITION OF APPLE PECTIN AND THE MOLECULAR STRUCTURE OF THE ARABAN COMPONENT OF APPLE PECTIN.
Ibid. 454-60.

The properties of pectin obtained from apple pomace indicate that it is a mixt. of araban(I), galactan and the Me ester of pectic acid. The pectic acid is composed mainly, if not entirely, of anhydrogalacturonic acid residues. The I has been isolated in the form of its methylated derivs., which on hydrolysis gives rise, in equimol. proportions, to 2, 3, 5-trimethyl-l-arabinose, 2,3-dimethyl-l-arabinose, and 3-methyl-l-arabinose. Proofs of the structure of these sugars are given and it appears that all 3 combined in the polysaccharide in the furanose form. The constitution of the I present in apple pectin is discussed in the light of the above observations; it is shown that in the main features of its structure this I is identical with the I which can be isolated from the pectic materials of the peanut. C.J.West

Inaba, T. and Kitagawa, K.

MANCHURIAN OIL SEEDS. I. PERILLA, FLAX AND HEMP.
J. Soc. Chem. Ind., Japan 38, Suppl. binding 73-4(1935); C. A. 29, 3183 (1935).

White and black perilla oil seeds had an oil content of 48.37 and 45.75%, resp., flaxseed 31.93% and hempseed 30.18%. II. Sunflower, soybean and sesame. Ibid. 74-5. The oil contents were: sunflower: husk 1.42% and kernel 58.15%; soybean: green 16.70%, black 18.27%, red 18.58% and yellow 19.79% (I no. of yellow lower than others); sesame: white 54.98% and black 44.71%. III. Cottonseed, peanut, castor bean and Chine jute seed. Ibid. 75-7. Oil contents were: cottonseed: American 21.67%, native Chinese 19.50%, Japanese 18.63% and Russian 22.38%; peanut: large 44.99% and small 46.46%; castor bean 51.91%; and China jute seed 18.30%. Analytical consts. for the various oils are presented: K.K.

Kerle, W. D.

THE PEANUT.
Agr. Gaz. N. S. Wales 29, 429, 471-9 (1918); C. A. 13, 146 (1919).

Analyses of parts of the peanut plant, digetible nutrients, av. of digestibility, analysis of peanut hay, and fertilizing constituents in various parts of the plant. A report is given of the suitability of soils in Australia for peanut production, trials of local and imported American varieties, and the future of the industrial side of peanut production. R. B. Deemer

Kluin, G.

REFRACTOMETRIC DETERMINATIONS IN OIL-BEARING RAW MATERIALS (PEANUTS, RAPE SEED, PALM SEED, CACAO SEED).
Pharm. Weekblad 74, 1234-49 (1937); C. A. 32, 377 (1932).

This method compares favorably with the Soxhlet extn. method. Properties of fat solvents for use in refractometry are given. E. J. Czarnetzky

Konig, J.

COMPOSITION OF THE INNER BROWN SKIN OF THE EARTH-NUT .
Biod. Centr., 1887, 141; B. A. 1887, 519.

This substance contains water, 9.01 percent; albuminoids, 12.68; fat, 11.76; non-nitrogenous matter, 20.46; fibre, 34.90; ash, 11.19. The author considers the price usually charged for this substance (5.4 marks per centner.) too high; being indigestible, its price ought to be 3 marks. W.E.P.

"
Kuhl, H.

STUDIES OF SOME SHELL FRUITS AND SEEDS WITH RESPECT TO THE FAT AND THE NITROGEN CONTENT.
Pharm. Ztg., 54, 58; C. A. 5, 927 (1911).

The seeds of Arachis hypogaea obtained from the German colonies, contained 48.86% fat and 5.18% N; by calculation this = 32.41% protein although the figure is not exact as other N-bearing substances are present. The seeds of Bertholletia excelsa Hb., from Brazil contained 62.73% fat and 2.59% N = 16.20% protein. Two specimens of hazel nuts, varieties of Corylus tubulosa, were examined. In one the fat content was 56.04% and the N content 2.47%, 15.44% protein. In the other the fat content was 60.22% and the N content 2.47%. Several specimens of the seeds of Juglans regia were examined. The first (a German walnut) contained 56.78% fat and 3.12% N. The French nut contained 60.71% fat and 2.82% N. The contents in protein were resp. 19.49% and 17.63%. L.E. Warren.

Maquenne, Leon

CHANGE IN COMPOSITION OF OLEAGINOUS SEEDS DURING GERMINATION .
Compt. rend., 127, 625-628 (1898); B. A. 1899, ii, 171.

It is well known that the germination of many oleaginous seeds is accompanied by an increase in the amount of sugar present, and a decrease in that of the fats; in order to determine whether sugar is elaborated, during this change, from the acid radicle of the fat, and, if so, whether the nature of the latter influences the result, the behaviour, during germination, of seeds of Arachis (earth nut) and Ricinus (castor oil seed) was studied. The former contains the saturated fatty acid, arachidic acid, whilst the latter contains the unsaturated ricinoleic acid. The seeds were grown in sand at 20-25°, complete analyses being made at different stages of the plant's growth. The results obtained indicate that the amount of oil decreases in both kinds of seed during the whole period of germination; the maximum increase of total carbohydrates present, including "cellulose" occurs after 18 days in the case of Arachis, and after 10 days in that of Ricinus. In the first case, the increase is 5.6 per cent., and in the second 16 per cent.; the former appears entirely attributable to the glycerol of the oil being transformed into sugar, but the latter involves a transformation of the ricinoleic acid into carbohydrates. The term "cellulose" used by the author denotes that portion of the plant which remains after successive treatment with light petroleum, dilute sulphuric acid, and 10 per cent, caustic potash; it contains, in addition to true cellulose, insoluble substances richer in carbon, which are sometimes nitrogenous. The sugar formed appears to consist principally of glucose, associated, perhaps, with levulose. In the case of Arachis, there is an initial decrease

in its amount, with a subsequent increase, whilst in the case of Ricinus, a very rapid increase first occurs, followed by an equally rapid decrease; in the former case, the increase of "cellulose" is continuous, whilst in the latter it is preceded by a decrease. The amount of nitrogen present undergoes little change.

Generalising from his results, the author considers that the fatty acids are less readily transformed into sugars than acids of the oleic series, and probably take part only in respiratory function. The change of unsaturated acids, and especially of ricinoleic acid, into sugar, probably depends on the presence in the center of the acid chain of the allyl grouping, $CH=CH-CH_2$; this is liberated by the progressive combustion of the ends, and gives rise, initially, to glycerol, which subsequently undergoes polymerisation. W...D.

Margaillan, L. and Favier, R.

PEANUTS FROM THE ARGENTINE REPUBLIC AND THEIR OILS.

Chimie & Industrie Special No. 898 (April, 1934): C.A. 28, 6007 (1934).

One sample of peanuts from the Cordoba district of Argentina had the following compn.: wt. per cu. m. 190 kg (unshelled), 680 kg. (shelled), H_2O 6.1, oil (extd. with petr. ether) 43.5, protein 21.0 crude fiber 1.9, ash 2.65(P_2O_5 0.58), N-free ext. by difference 24.85%. Oil obtained by pressing in a small lab. press (which removed only about half the total oil present in the nuts) and oil obtained by extn. with petr. ether had the following characteristics: d_{20} 0.9187, 0.9171; n_{20} 1.4717, 1.4718; acidity as oleic acid 0.35, 0.96%, I no. 103, 101. A. Papineau-Couture.

Margaillan, L. and Reybaud, H.

CHINESE PEANUTS AND THEIR OILS .

Chimie & industrie Special No., 896-7 (April, 1934): C.A. 29, 949 (1935) 1

Three samples of Chinese peanuts had the following compn.: wt. per cu. m. 602-50 kg., H_2O 5.05-6.0, oil 42.1-43.6, protein 21.1-24.5, crude fiber 2.1-2.6, ash 1.88-2.5%. The oil obtained by pressing these nuts had the following characteristics: d_{20} 0.914-0.9146, n_D^{20} 1.4710, sapon. no. 194.5-196.5, I no. 97-98.5, acidity as oleic acid 0.5-1.5%. A. Papineau-Couture

Maze, Pierre

TRANSFORMATION OF FATTY SUBSTANCES INTO SUGAR IN GERMINATING OLEAGINOUS SEEDS.

Compt. rend., 134, 309-311 (1902); B.A. 1902, ii 346.

The results of experiments with earth-nut showed that a progressive fixation of oxygen took place, with probably a slight loss of carbon, and that sugar is produced from the fat. N.H.J.M.

Mello Geraldes, C. de

CHARACTERISTICS OF PEANUTS OF PORTUGUESE GUINEA.

Anais inst. sup. agron. 6, No. 1, 36-44 (1934); Chimie & industrie 33, 1182; C.A. 29, 5295 (1935).

The moisture content is low and falls well within normal limits (4-11%); the oil content of the kernels is normal or above normal (47.07%), and the chem. compn. of the kernels also is normal (albuminoids 26.05, crude fiber 2.13, ash 2.12%). There is no relationship between the percentage of kernels in the whole nuts and the percentage of oil in the unshelled nuts. A. Papineau-Couture

Miyama, Ryosuke

A CHEMICAL INVESTIGATION OF THE GALACTORARABAN PREPARED FROM THE SEEDS OF THE PEANUT.

J. Dept. Agr. Kyushu Imp. Univ. 4, 195-236 (1935); C.A. 29, 4741(1935).

The oil-free peanut powder was repeatedly extd. with cold 0.2% NaOH to remove protein and then the residue was extd. with hot 0.2% KOH. The galactoaraban (I) was pptd. from this ext. by alc. and purified by recrystn. and by pptn. of the Cu salt. Yield, 0.6%. Hydrolysis with 3% H_2SO_4 on the water bath for 28 hrs. gave a sirup contg. chiefly arabinose, galactose, and galacturonic acid. It seemed evident that the latter was an oxidation product of galactose and when calcd. as galactose, the ratio of galactose to arabinose became 1:2. Decompn. by acetolysis and isolation of the white needles of nonaacetylgalactoarabotriose, m. 115-18°, (a)D 95.44°, showed I to be a compd. and not a mixt. Methylation both of I and of acetylated I gave derivs. which approximated heptamethylgalactoraban (II) in compn. Decompn. of II was accomplished by heating its MeOH soln. with 1% HCl in a sealed tube at 100° for 50 hrs. and then at 130° for 50 hrs. The fractions obtained on neutralizing, bleaching, drying, and vacuum-distg. were analyzed for OMe content and found to correspond to a trimethylgalactose and di- and trimethylarabinose. The inability of the scission products to form osazones and combinations with Ph_3COCl, the formation of fully methylated derivs. on further methylation and of acids on oxidation with HNO_3, and the isolation from them of tetramethyl-d-galactopyranose anilide and 2,3,4-trimethylaraboglutaric acid diamide showed that II was composed of 2,3,4-trimethyl-d-galactopyranose and 2,3-dimethyl-l-arabopyranose. I, therefore, probably consists of - (A)-(A)-(G)-(A)-(A)-(G)-(A)-(A)-(G)-(A)----with 1:4-, 1:4- or 4:1-, 4:1, 4:1-linkages, these 2 formulas becoming the same when arranged from the stereochem. standpoint. A. W. Dexter

Nassonov, V. A.

VOLUME RELATIONS OF THE INTRACELLULAR CONSTITUENTS IN OIL SEEDS

Masloboino Zhirovoe Delo 14, No. 2, 23-4 (1938); C.A. 32, 7295 (1938).

Microscopic examn. of various oil seeds with the Zeiss immersion objective 90 and oculars 10X and 30XXand a drawing prism disclosed the following relative percentages by vol. of aleurone grains and eleoplasm in the order stated: castor beans 18-25, 75-82; sesame 21, 79; peanut 24, 76; cottonseed 29-34, 66-71, and soybean 31-4, 66-9. The results indicate that the seeds with greater contents of oil show greater relative vols. of eleoplasm, though the proportion between these 2 values is not very sharply defined; fix., the seeds differ in their oil contents more sharply than in the vol. of eleoplasm. Chas. Blanc.

Noerdlinger, H.

ANALYSIS OF FATS.

Zeit. anal. Chem., 29, 6-13; B. A. 1890, 929.

Attention is called to the importance of estimating the free fatty acids in oils, and in articles of food containing fatty constituents, as the freshness and quality of the substances are closely connected with the amount of free acid present. To secure uniformity all results are stated as oleic acid. The following table shows the mean percentage of fat and free fatty acid in various seeds:

	100 parts of seed contain		100 parts of fat contain free fatty acid
	Free fatty acid	Total fat	
Turnip (Brassica rapa)	0.42	37.75	1.10
Colza (B. campestris)	0.32	41.22	0.77
Poppy (Papaver somniferum)	3.20	46.90	6.66
Earth-nut (Arachis hypogaea)			
a. Seed	1.91	46.09	4.15
b. Husk	1.91	4.43	43.10
Sesame (Sesamum orientale)	2.21	51.59	4.59
Castor (Ricinus communis)	1.21	46.32	2.52
Palm kernel (Elais guinensis)	4.19	49.16	8.53
Cocoa-nut (Cocos nucifera)	2.98	67.40	4.42

In pressing oil from seeds, the free fatty acids are not obtained pari passu with the neutral oils. For instance, 100 parts of poppy seed containing 46.9 parts of oil, of which 3.2 parts are free acid, will yield on first pressure 39 parts of oil containing 0.75 part of acid, on second pressure 2.5 parts of oil containing 0.38 part of acid, and will leave in the cake 5.4 parts of oil, of which 2.07 are acid. The following table gives the oil and free acid in the residue left after pressing:

	100 parts of cake contain						100 parts of the oil contain free fatty acid		
	Free fatty acid			Total fat					
	Max.	Min.	Mean	Max.	Min.	Mean	Max.	Min.	Mean
Rape cake	1.02	0.72	0.93	9.70	7.67	8.81	13.23	8.39	10.55
Poppy cake	6.86	3.72	5.66	10.34	8.92	9.63	70.70	43.70	58.89
Earth-nut cake	4.92	0.37	1.42	12.47	5.70	7.65	39.42	6.45	18.62
Sesame cake	7.80	2.66	6.15	21.90	11.20	15.44	58.62	20.24	40.29
Palm kernel cake	3.16	0.62	1.47	14.70	8.00	10.39	26.21	6.28	14.28
Extracted palm kernel meal	---	----	1.55	----	----	18.68	----	----	8.29
Cocoa-nut cake	1.63	0.91	1.31	16.11	10.10	13.11	13.88	7.27	10.51
Linseed cake	1.06	0.43	0.75	10.80	6.82	8.81	15.50	4.00	9.75
Colza cake	1.74	0.88	1.27	8.17	4.80	6.53	28.72	8.33	20.07

The fact that in the extracted palm-kernel meal the residual oil contains the same percentage of acid as the oil in the original seed, shows that the solvents used (carbon bisulphide or petroleum) exert no selective action, and this may serve as a means of distinguishing extracted from expressed oil, as well as the residual cake from the respective methods. In various specimens of deteriorated oil-cake (palm kernel and cocoa-nut) the free acid in the residual oil ranged from 17 per cent. to the whole. M.J.S.

Padilla, Salvador P. and Soliven, Florencio A.
CHEMICAL ANALYSIS FOR POSSIBLE SOURCES OF OILS OF FORTY-FIVE SPECIES OF OIL-BEARING SEEDS.
Philippine Agr. 22, 408-15 (1933); C. A. 28, 2207 (1934).
The results of the principal detns. on the fresh seed are as follows:

Species	Moisture	Ash	Protein	Fat	Carbohydrate
Arachis hypogaea	4.58	2.57	42.77	42.03	8.05
Gossypium hirsutum	10.48	5.28	38.53	34.09	11.62

(Similar analyses are given for 43 other varieties of seeds) A.L.Mehring

Patel, J. S. and Seshadri, C. R.
OIL FORMATION IN GROUNDNUT WITH REFERENCE TO QUALITY.
Indian J. Agr. Sci. 5, 165-75 (1935); C.A. 29, 7519 (1935).
As the groundnut seed develops, the percentage of oil gradually increases except in the early stages immediately following blooming and the period just preceding maturity. The percentages of H_2O and free fat acids decrease with the development of the seed. The harvesting of groundnuts even 1 week before the kernels are fully ripe increases the quantity of free fat acid and reduces the oil content of the kernels by approx. 5%. The most rapid accumulation of oil occurs during the fortnight commencing with the 32nd day after flowering. The decrease in free fat acids is most rapid during the period between the 25th and 39th days after flowering. K. D. Jacob.

Paulino, Pedro L.
PRELIMINARY STUDY ON PEANUT VARIETIES AT THE LAMAO EXPERIMENT STATION, LAMAO, BATAAN.
Philippine J. Agr. 1, 273-86 (1930); C. A. 25, 3188 (1931).
The oil contents of 13 varieties of peanuts are given. Varieties proving rich in oil, as per sample submitted, were Japanese 56.90%; Tennessee Red, 56.40%; North Carolina Runner, 54.37%; and the San Jose No. 1, 54.13%. Other varieties had 44.99-54.10% oil content. By analysis on the dry basis Tennessee Red contained 60.07% of oil; Japanese, 58.80%; San Jose No. 1, 58.08%; and San Jose No. 2, 58.01%; while other varieties contained 49.08-56.94%. John O. Hardesty

Reed, J. B.
BY-PRODUCTS FROM CRUSHING PEANUTS.
U. S. Dept. Agr., Bull. 1096, 1-12 (1922); C.A. 16, 3981 (1922).
Analyses are given of various products obtained in the crushing of peanuts, such as peanut meal, cake, hulls, skins, germs and meats. The av. crude-fiber and protein content found for hulls were, resp., 67.5% and 5.4%; and of meal, 4.7% and 51.7%. The percentage of hulls in a mixt. of peanut meal and hulls may therefore be detd. approx. either from the fiber or the protein content. The compn. of peanut germs is similar to that of the meats with somewhat lower oil and higher ash contents. W.H. Ross

Rosenthaler, L.

VARIATION STATISTICS AS AUXILLIARY SCIENCE OF PHARMACOGNOSY. XIII. OIL CONTENT OF CASTOR BEANS.

Arch. Pharm. 262, 25 (1924); C.A. 18, 3073 (1924); cf. C. A. 18, 1361.

Examn. of 100 each of 2 different com. samples yielded the following data: I. Av. value 68.47 ± 0.43%, standard deviation ± 4.33 ± 0.31 %, typical value 64.14-72.80%, variation coeff. 6.32 ± 0.45; II. Av. value 69.83 ± 0.60%, standard deviation ± 6.04 ± 0.43%, typical value 63.79-75.87%, variation coeff. 8.65 ± 0.61. XIV. OIL CONTENT OF PEANUTS. Ibid 26-7. Values obtained in the examn. of 102 peanuts gave: av. value 46.68 ± 0.49%, standard deviation ± 5.04 ± 0.35%, typical var. value 41.64 - 51.72%. W.O.E.

Rossem, C. Van

THE COMPOSITION OF THE MOST IMPORTANT VEGETABLE FOODSTUFFS OF THE DUTCH EAST INDIES.

Mededeel. Algem. Proefsta. Landbouw. (Buitenzorg) No. 24, 76 (1927) (with a summary in English); Intern. Rev. Agr. (N.S.), 19, No. 5, 465-6; C.A. 23, 3988 (1929).

Analyses are given of the principal foodstuffs of vegetable origin in the Dutch East Indies: Andropogon sorghum, Arachis hypogaea, Coix lacrima, Glycine Max (G. soja), Oryza sativa, Phaseolus radiatus, Sesamum orientale, Vigna sinensis, Voahdzeia subterranea, Zea mays, Canna edulis, Coleus tuberosus, Dioscora sp. div., Ipomaea batatas, and Manihot utilissima. A table is given indicating the physiol. heat from combustion and also a table of the analyses of the most important European foodstuffs for comparison. H.L.D.

Sah, Peter P. T., Ping, Kuo, Ma, Tsu-Sheng, Chow, Jui

CHEMICAL STUDIES ON CHINESE PEANUTS AND PEANUT OILS

Science Repts. Natl. Tsing Hua Univ. (A), 1, 289-94 (1932); C. A. 27, 3013 (1933).

Analyses of kernels of two Peking varieties of Arachis hypogea show protein 29.04 and 36.38%, fat 51.13 and 53.72%. Samples of oils prepd. from both show practically the same consts. whether prepd. by extn. or by expression. Wm. H. Adolph

Shifrin, Kh. B.

BIOCHEMISTRY OF ARACHIS L.

Biokhimiya Kul'turnykh Rastenii 3, 301-31 (1938); Khim. Referat. Zhur. 1, No. 11-12, 60 (1938); C. A. 33, 8431 (1939).

A review of the literature on the dependence of the chem. compn. of the seeds on growth conditions (climatic conditions, irrigation, fertilization, etc.). The carbohydrates of Arachis L. are little investigated. Its seeds are rich in starch (21.11%), and contain pectin substances and pentosans (about 4%). The chem. compns. of the leaves and of the hay of Arachis L. used as green fodder are given. Comparative data of other investigators are discussed about the grades of Arachis L. which contain large amts. of oil and proteins. Chem. analyses of different grades are given. W.R.H.

Stansel, R. H.

PEANUT GROWING IN THE GULF COAST PRAIRIE OF TEXAS

Tex. Agr. Expt. Sta., Bull. 503, 5-16 (1935); C. A. 29, 4094 (1935).

Culture and yields of various varieties are given. The protein content of peanut hay is 10-12%. Spanish-type peanuts contain 47-50% oil and 31% protein; Virginia-type 37-47% oil and 29-30 protein. One ton of Spanish peanuts yields 79-80 gal. of oil and 1300-1400 lb. of

cake. One ton of shelled nuts yields 100-115 gal. of oil and 1100-1200 lb. of cake contg. 40-50% protein. Peanut proteins are highly digestible. C. R. Fellers

Stokes, W. E., Leukel, W. A. and Camp, J. P.
EFFECT OF POTASH ON YIELD AND QUALITY OF SPANISH PEANUTS.
Fla. Agr. Expt. Sta., 45th Ann. Rept. 44 (1931); C.A. 27, 797 (1933).
Addn. of K_2O increased the yield of peanuts but not enough to pay a profit over the cost of the fertilizers. The peanuts grown under various K treatments showed no marked differences in percentage of carbohydrate, protein or oil content. The I, Reichert-Meissl, and acidity nos. of the oil were unaltered by fertilizer treatment. The n of the oil showed the greatest variation. Peanuts of better grade were produced by plants fertilized with large applications of K. C. R. Fellers

Traetta-Mosca, F.
GALACTOSE IN SEEDS.
Ann. ist. super. agrar. Portici (3) 3, 164-6 (1929); C.A. 25, 3691 (1931).
Two hundred g. of kidney beans, ground to a flour, was extd. with ether to remove fats, then heated to 100° to destroy enzymes and finally dialyzed with water under a bell jar, filled with $CHCl_3$ vapors to avoid the presence of starch-hydrolyzing bacteria, the w water being changed 4 times at 2-day intervals. Basic Pb acetate was added to the united liquids and, after filtering, the Pb was removed with H_2S. The filtrate from the PbS was evapd. to a sirupy consistency under 20 mm. pressure, washed with ether, dild. with water boiled under reduced pressure with animal charcoal, filtered and again concd. under reduced pressure to a sirup. After adding 50% AcOH and bringing to 25 cc. phenylhydrazine was added and the whole was heated 1 hr. on a water bath. On cooling and diluting with water yellowish crystals formed, contg., after purification by soln. in alc. and repptn. with water, 15.69% N and m. 195° (with decompn.), corresponding to the phenylosazone of galactose. Peas, peanuts and lentils yielded the same phenylosazone. Sunflower seed gave phenylosazone corresponding to that of glucose, levulose and mannose. Albert R. Merz

Wad, Y. D. and Desai, L. N.
VARIATION IN SEED COMPOSITION OF CROP PLANTS. 1. INFLUENCE OF SOIL AND CLIMATE.
Proc. Soc. Biol. Chemists, India 3, 49-62 (1938); C.A. 32, 8477 (1938).
The chem. compn. of seeds of the same varieties of groundnut, wheat and cotton grown in different tracts or in lysimeters showed large variations. Conclusion: By influencing soil environment changes could be produced in the components of both com. and nutritive value of the seed produced. Philip L. Harris

Lishkevich, M.I.

PHOSPHOROUS SUBSTANCES IN SOME OIL SEEDS.

Masloboino Zhirovoe Delo 13, No. 6, 9-10 (1937); C.A. 32, 4366 (1938) cf. C.A. 32, 820.

Vacuum-dried seed meals were extd. successively with Et_2O, abs. alc., C_6H_6 and 2% HCl. P was detd. in all the extns. and phytin in the HCl extns. by the Gebner and Stadler method. The contents of total P_2O_5 and phosphatides decrease in the order given: cottonseed, soybean, sunflower seed, flaxseed, castorbean and peanut. The computed lecithin content is considerably lower (up to 10 times) than that of phosphatides sol. in alc. and C_6H_6. Cottonseeds contain max. lecithin. Of the P contents in the oil seeds 52-76% is combined as phytin, 1.4-8.3% as phosphatides and the balance is contained in phosphorproteins in the HCl extn. and in the insol. matter. Cottonseeds and sunflower seeds are the richest in phytin P. Chas. Blanc

Anonymous

PEANUT BUTTER MANUFACTURE. 1921
Spice Mill 44, 1850-4, 2118-20 (~~1920~~); C.A. 16, 1625 (1922).
C.W.Trigg

Allen. L.A.

CALORIFIC VALUE OF SOLUBLE CARBOHYDRATES IN FEEDING STUFFS.
J. Agr. Sci. 18, 691-701 (1928); C.A. 23, 5249 (1929).
Investigations were conducted to arrive at a value for the heat of combustion of acid- and alkali-sol. carbohydrates in feeding stuffs, without isolating the constituents. The content of fat or oil, protein and ash were detd. by the usual methods. The fiber content was estd. by boiling the dried whole meal successively with 1.25% H_2SO_4 and 1.25% KOH for 30 min. The remainder of the dried whole meal was assumed to be carbohydrates. The heats of combustion of the whole meal, fat-free meal and fiber were detd. in a bomb calorimeter; that of the protein was calcd. from known data. From these results the calorific value of the sol. carbo-hydrates was calcd. These values varied from 3284 to 4864 cal. per g. in the cases of ground nut cake and straw, resp. The results indicate that the calorific values of the carbohydrates in different feeding stuffs are very variable quantities, and are also considerably higher than the values usually assigned to the simpler carbohydrates of known constitution. It has been shown that the heats of combustion of these simpler carbohydrates generally increase with increasing mol. complexity; and it has also been shown that crude fiber is a mixt. of variable compn. of more complex carbohydrate and lignin substances, some of which are more or less dissolved by acid and alkali. Hence it would appear that, in estg. the carbohydrate content and the calorific value by the method adopted, these more complex compds. must enter into consideration. The presence of complex carbohydrates which are either wholly or partially hydrolyzed by dil. acid and alkali may also explain the variation in the heats of combustion as estd. P. R. Dawson

Ascham, Leah

PEANUT MEAL. FOOD VALUE AND USES.
Ga. Agr. Expt. Sta., Bull. 195, 3-18 (1936); C.A. 31, 6364 (1937).
P Peanut meal contains fat 6-8, protein 43-48 and carbohydrates 23-25%. The meal contains the antipellagric vitamin. C.R.F.

Backer, Leslie H., Keenan, Joseph H., and Kopf, Joseph L. (to Jabez Burns & Sons,Inc.)

ROASTING COFFEE, CACAO BEANS, PEANUTS, ETC.
U. S. 2,081,349, May 25; C.A. 31, P5058 (1937).
Roasting gases are heated by contact with a heating element heated to incandescence and, after coming into contact with the material undergoing roasting, are recirculated to the heating to burn smoke particles which they carry, and are then passed again to the roasting chamber. Various details of app. are described.

Bailey, H. S. and LeClerc, J. A.

THE PEANUT A GREAT AMERICAN FOOD.

Bur. Chemistry. Dept. Agr. Year Book (Separate 746), 289-301 (1917); C.A. 12, 1802 (1918).

A discussion of the uses and important food value of the peanut and its products, peanut flour, peanut-oil cake and peanut oil. Recipes are given for prepg. peanut bread and various dishes in which peanut products are included. Tables of analyses are also given comparing the comprn. of peanut flour and peanut bread with wheat flour and wheat bread. W.F.Ross

Baird, R. O.

ANALYSIS OF PEANUT BUTTER.

North Dakota State Food Comm. and Chem. Bull, 3, 1-3(1923); C. A. 18, 3236 (1924).

The min. and max. figures reported for a no. of brands of peanut oil and peanut butter are: peanut oil n_{25} 1.4668 and 1.4696, and I no. 84.1 and 95.7; for peanut butter moisture 1.21 and 2.54%; ash 2.09 and 3.4%, crude fiber 1.54 and 2.31, crude fat 43.88 and 55.30, protein 29.93 and 34.05 and N-free ext. 7.22 and 17.82%, resp. J. J. Skinner

Baker, Frank and Baker, Hyman

SALTING PEANUTS IN THE SHELL.

U. S., 966,514, Aug. 9; C.A. 4, P2960 (1910).

Salting peanuts in the shell by forcing cold salt soln. through the pores of the shell by pressure and evaporating the liquid from the shell.

Balland.

THE SUBSTITUTES USED FOR WHEAT IN MAKING WAR BREAD.

Rev. sci. 56, 353-6 (1918); C.A. 12, 2217 (1918).

The substitutes used were flours of peanuts (p), Morocco beans (m.b.), kidney beans, maize (m), tapioca (t), millet, barley (c), dwarf peas, potatoes, rice (r), buckwheat, rye, soy beans (s.b.) and sorghum. Flours of oats, chestnuts, fenugreek and cotton were suggested but have not yet been tried out. Analyses for fuel value in these flours were made. The substitutes were found to act upon the gluten content of the wheat flour lowering it from 33% to 24, 29, 26, 24, 27 and 30% in the cases of t, r, m, c, m.b., p, and s.b., resp., when 10% of substitutes were mixed with wheat flour, The bread from substitutes retains more water (38 to 41%). S.b. seems to give the best results for bread thus obtained, is very substantial, tastes well and keeps fresh for some time. Lillian Offutt

Beattie, James H. and Jackson, Albert N.

PEANUT BUTTER.

U. S. 1,731,647, Oct. 15; C.A. 24, P173 (1930).

In order to prevent subsequent sepn. of oil and solid substance, peanut butter is sealed in air-tight containers and the containers are subjected to the action of steam under pressure.

Brown, Leo C. (To E. K. Pond Co.)
PEANUT BUTTER.
U. S. 1,926,369, Sept. 12; C.A. 27, P5841 (1933).
Finely divided nut particles and a carrier of oil are admixed with a small proportion (suitably about 1-5% of the product) of a glyceryl ester of a fatty acid having a free glyceryl alc. group, such as the monoglyceryl ester of stearic acid.

Church, Margaret B.
SOY AND RELATED FERMENTATIONS.
Spice Mill 47, 168-73, 576-81 (1924); C. A. 18, 1863 (1924).
Soy sauce is made by treating specially prepd. soy beans and wheat or a starchy material with a mold ferment from the Aspergillus flavus-oryzae group. Extensive expts. show possibility of its manuf. in U. S. A. Peanut press cake is suitable for use in making sauces similar to soy sauce. C. W. Trigg.

Clendenin, Wm.
PEANUT BUTTER AS A FOOD.
Am. Food. J. 19, 581-3 (1924); C.A. 19, 1168 (1925).
J. A. Kennedy

DuPuis, Robert N, Lenth, Charles W. and Segur, John B. (To American Soap & Glycerine Producers, Inc.)
FOOD PRODUCT FROM PEANUTS AND GLYCEROL.
U. S. 2,166,806, July 18; C. A. 33, P8852 (1939).
About 0.1-20% of the free glycerol is added to finely subdivided peanuts, and serves to inhibit segregation of oil in products such as peanut butter.

Erslev, K.
ARTIFICIAL MILK.
Brit. 121,133, Nov. 28, 1918; C.A. 13, P624 (1919).
In making artificial milk from vegetable substances such as soy beans, earth nuts, pine kernels, sesame seeds, leguminosae in general, coconuts, palm kernels, or almonds, especially such as contain sugar and lecithin, the material is first treated with a solvent to ext. fat and then extd. with alc. The alc. ext. is evapd. to dryness and treated to remove any bitter taste. The residue from the alc. extn. is treated with a weak alk. soln. to dissolve proteins, and the ext. thus obtained is mixed with the treated material from the alc. ext. The substance thus obtained may be used in the manuf. of margarine. It may also be emulsified with fat; especially the fat originally ext. to produce artificial milk. The residue, after extn. with alkali, may be used as a cattle food.

Friedrichs, H. W. A. T.
MAKING A FOOD PRODUCT FROM PEANUTS.
U. S., 1,066,200, July 1; C.A. 7, P2811 (1913).
Making a food product from peanuts by roasting, removing the husks and softening the roasted kernels with H_2O. Cf. C.A. 7, 2446.

Friedrichs, H. W. A. T.
RENDERING GROUND NUTS LESS BRITTLE AND IMPROVING THEIR TASTE BY ROASTING AND DRYING THEM, AND MOISTENING THEM WITH H_2O WHICH MAY CONTAIN AN ESSENTIAL OIL.
British Patent 2,676, Feb 1, 1912; C.A. 7, P2446 (1918).

Georgi, C. D. V.
STORAGE OF OIL CAKES.
Malayan agr. J. 22, 63-8(1934); C.A. 28, 5898 (1934).
The change of oil content on storage (12 weeks) of rice-milling by-products, coconut, gingelly and groundnut cake was relatively small, but the acidity of the extd. oil increased notably, except in the case of the by-products of milling of parboiled paddy. B.C.A.

Greig, E. D. W.
ANTI-BERI-BERI VITAMINE IN GROUND NUT MEAL BISCUITS.
Indian J. Med. Res. 6, 143-6 (1918); Physiol. Abstracts 4, 88; C. A. 13, 20,67 (1919).
These biscuits were found to be about equal in antineuritic potency to the best brand of atta biscuit previously examd. They are therefore recommended as an emergency ration for troops.

Hoffman, Frederick H.
FOOD PRODUCT (NUT BUTTER MIXTURE).
U. S. 2,079,288, May 4. ; C. A. 31, P4410 (1937).
In order to minimize gravitational sepn, of the ingredients used, peanut kernels are ground alone to form a paste or butter and to the product, while it is still at the temp. of grinding, there are added an edible oil and strained bees' honey, each heated to about 70° (the ground peanut material being of about the same temp.). App. is described.

Hunter, H. B.
MAKING A FOOD PRODUCT FROM COMMERCIAL COCOA AND PEANUT BUTTER.
U. S. 1,043,839, Nov. 12; C.A. 7, P187 (1913).

Johns, C. O., Finks, A. J. and Paul, Mable S.
THE NUTRITIVE VALUE OF PEANUT AND SOY BEAN FLOURS AS SUPPLEMENTS TO WHEAT FLOUR.
Science 49, 573 (1919); C.A. 13, 2906 (1919).
An abstract. Bread containing 75% wheat and 25% of peanut or soy bean flours, together with a suitable salt mixt. and butter fat produced normal growth when fed to albino rats. These diets contained approx. 18% of protein. Normal growth was also obtained when the total protein content of the diet was only 11%. Controls were made by using wheat bread as the only source of protein and the growth was 1/3 to 2/3 normal, this diet containing 11% of protein. The investigation is still in progress. E. J.C.

LeClerc, J. A. and Wessling, H. L.

THE CHEMICAL ANALYSIS OF WHEAT-FLOUR SUBSTITUTES AND OF THE BREADS MADE THEREFROM.

U. S. Dept. Agr., Bull. 701, 10 pp. (1918); C.A. 12, 2630 (1918).

Analyses of flours of the following part substitutes and the breads made from them are given: chestnut; cassava; banana; ripe and unripe; dasheen, peeled and unpeeled; potato, dried, flakes, boiled, starch; sweet potato; corn, yellow and white; rice, polished and brown; buckwheat; rye; oatmeal; feterita, clear and patent; millet; kafir, milo; kaoliang; barley; white bean; ordinary and chick-pea; peanut; soybean; bran; wheat germ; treated cottonseed; peanut oil cake, and soybean oil cake. All breads were made from mixts. of flour in proportion of 25% substitute to 75% standard wheat flour. The nutritive value, the color and texture of the loaf and the amt. of salt-free ash of the breads are given. The color and texture are illustrated in a series of 34 photographs. All breads containing substitutes (except rice and starch) are richer in mineral matter than wheat-flour bread. Differences in fat content are significant only when such materials as the soy-bean and unpressed peanut meal are used. The calcd. caloric value of the various breads is very nearly the same. The protein content varies from less than 7% (with starch) to nearly 15% (soybean bread). Albert R. Merz

Mackenzie-Wallis, K. L.

FOOD VALUE OF THE GROUND NUT (ARACHIS).

Indian J. Med. Research 6, 45-55 (1918); Physiol. Abstracts 3, 518; C. A. 13, 2247 (1919).

Quite apart from the oil prepd., the nut is of high nutritive value and a flour called "nutramine" made from it is highly recommended. The nut is very abundant in India and is a provision of nature to supplement the rich carbohydrate food of the natives. Not only is the protein content high, but the flour is rich in amino acids and, moreover, it is anti-scorbutic. C. J. West

Melhuish, W. J.

MILK SUBSTITUTE FROM PEANUTS AND SOY BEANS.

U. S., 1,243,855, Oct. 23; C.A. 12, P194 (1918).

Peanuts are cleaned and coarsely ground and the sol. nitrogenous and oily matter is extd. from them by treatment with a hot, slightly alk. aq. soln. containing also salts usually found in milk. The residue is strained and pressed and a very small amt. of butyric acid is added to it. Ground soy beans are treated with a hot, very dil. alk. soln. of a phosphate to ext. nitrogenous and fatty constituents and the strained and pressed ext. is mixed with the ext. from the peanuts in a vacuum pan and with added fats as desired, warmed to about 40°, mixed with sugar sirup and boiled under a vacuum of 26-29 in., and finally treated with milk ripening bacteria and citric acid and evapd. to the desired concn.

Musher, Sidney

INHIBITING RANCIDITY IN PEANUT BUTTER.
U. S., 1,816,338, July 28.; C.A. 25, 5477 (1931).
Peanut butter 75% is mixed with crushed sesame seed 25%.

Neale, M. K. M.

THE COMPOSITION OF PEANUT MEAL AND ITS USE AS A DIABETIC FOOD.
J. Am. Dietet. Assoc. 2, 73-85 (1926); Expt. Sta. Record 56, 92; C.A. 21, 3399 (1927).
Data on the compn. of choice peanut meal, including the distribution of carbohydrates, are: moisture 6.50, ether ext. 10.50, alc. ext. 16.07, carbohydrate of alc. ext. as glucose 3.49, carbohydrate hydrolyzed by enzymes as glucose (other than alc. ext.) 3.19, carbohydrate hydrolyzed by acid as glucose (other than alc. ext.) 10.96, total hydrolyzable carbohydrate 14.45, utilizable carbohydrate 6.68, nonutilizabl carbohydrate 7.77, pentosans 4.99, N x 6 25 51.56, ash. 3.77, crude fiber 4.50, and undetd. by difference 8.72%. On account of the small quantity of utilizable carbohydrate, as compared with 8.15% for soy bean commonly used as a diabetic food and 75.01% for wheat flour, a study was made of the possibility of using peanut meal in bread making as a substitute for wheat flour in proportions higher than those recommended by Johns and Finks (C.A. 19, 3100). It was found possible to make a palatable bread with the substitution of peanut meal for as much as 50% of the wheat flour by first toasting the meal and making it into a mush before mixing with the other constituents. This is estd. to reduce the available carbohydrate about 45% (from 20 to 8.4 g. per slice). H.G.

Ogden, John T.

PEANUT BUTTER MANUFACTURE, ITS OPPORTUNITIES AND PROBLEMS.
Glass Packer 3, 229-31 (1930); C.A. 24, 5082 (1930).
Flavor is developed in the roasting process, and waste products are volatilized at the same time. Excessive oil sepn. is caused by (1) too great a proportion of oily type nuts in the blend (2) by delay in applying a cooling air suction when a hot batch leaves the roaster and (3) by grinding elements that are improperly designed. Tannins and bitter principles in the red skins impart a bitter flavor to the butter. C. R. Fellers.

Pritzker, J. and Jungkunz, R.

NEW PEANUT COFFEE SUBSTITUTE.
Z. Untersuch. Lebensm. 64, 389-92 (1932); C.A. 27, 3259 (1933).
The analysis revealed the approx. compn. of the prepn. to be 33% coffee bean powder, 5% sugar and 62% roasted peanut powder. S.Laufer

Rosenfield, J. L.

PEANUT BUTTER.
U. S. reissue 15,918, Sept. 23; C.A. 18, P3659 (1924).
The major portion of the oil is removed from peanuts, and the residue is formed into a mass or cake and while hot is mixed with a hydrogenated edible oil.

Rosenfield, J. L.

PEANUT BUTTER.

U. S. 1,528,077, March 3; C.A. 19, P1462 (1925).

A portion of the peanut oil normally present in peanut butter is replaced by coconut oil to produce a product which will remain in a semi-solid condition at ordinary room temp.

Rowe, S.C.

REPORT ON (THE ANALYSIS OF) NUTS AND NUT PRODUCTS.

J. Assoc. Official Agr. Chem. 18, 418-23 (1935); C. A. 29, 7105 (1935).

Detailed descriptions are given of methods for the prepn. of sample, detn. of H_2O (2 methods), ash, crude fiber; fat, consts. of fat, and protein (2 methods); sugar and salt (2 methods); dextrose or d-glucose, starch in peanut butter; sepn. and prepn. of the oil, and microscopical examn. of almond paste, kernel paste, etc.; and glycerol in shredded coconut. They will be studied collaboratively. A. Papineau-Couture

Stockton, F.W.

PEANUT BUTTER.

U. S. 1,395,934, Nov. 1; C.A. 16, P598 (1922).

Sepn. of the oil from other ingredients of peanut butter is prevented by adding hydrogenated peanut oil or other solid fat and grinding the mixt. to a homogeneous pasty mass.

Utt, C.A.A.

SOME DATA ON PEANUT BUTTER.

J. Ind. Eng. Chem., 6, 746-7; C.A. 8, 3602 (1914).

Analyses of 23 samples of com. peanut butter are reported. Microscopic exam. did not reveal the presence of foreign starch in any of the samples. The following max. and min. figures were obtained: oil 46.44-53.64%, $n_D^{25^\circ}$ 1.4680-1.4707, I no. 88.76-94.36. None of the samples gave evidence of the presence of added oil. P.B.Dunbar

Warth, A. H.

SEPARATION IN PEANUT BUTTER CAN BE PREVENTED BY PROCESSING.

Glass Packer 4, 219-21 (1931); C.A. 5439 (1933).

In order to retain the roasted flavor of the peanuts, grinding should follow immediately after blanching, inasmuch as exposure to air produces oxidation and rancidity of the oil. The amount of peanut oil extd. from peanut butter decreased from 1.4725 to 1.4718 after heating in glass for 20 min. at 121°. The processing reduced the non-protein N and greatly increased the stability of the emulsion. C. R. Fellers

Wikoff, Helen L., Busey, Maribodine and Kaplan, A. M.
ANALYTICAL CONSTANTS OF PEANUT BUTTER.
Ind. Eng. Chem. 26, 291-2 (1934); C.A. 28, 2074 (1934).
The exptl. procedure is described. Analytical data are given, based on examn. of 10 samples purchased on the market. The moisture varied from 0.87 to 3.7%, with an av. of 1.74. Ash varied from 1.91 to 3.18%, av. 2.37 (dry basis); chlorides from 1.08 to 3.45%, av. 1.60 (dry meal basis); oil from 39.45 to 52.34%, av. 46.70 (dry basis); n from 1.4540 to 1.4749, av. 1.4676; crude fiber from 2.67 to 4.31%, av. 3.34 (meals); protein from 54.64 to 62.45%, av. 58.65 (dry meals), which is equiv. to 30.66% on the basis of the whole butter; reducing sugars are absent before hydrolysis. Starch, cellulose and pentosans were the polysaccharides found in the fat-free meal. F.L.D.

Wilkins, Minge.
TREATING PEANUTS TO PREVENT THEM FROM BECOMING STALE.
U. S. 984,334, Feb. 14; C.A. 5, P.1472 (1911).
Treating peanuts to prevent them from becoming stale, by roasting and successively applying hot H_2O, liquid paraffin and $NaHCO_3$ to the shells.

Willison, W. W.
PEANUT BUTTER.
U. S. 1,398,352, Nov. 29; C.A. 16, P766 (1922).
Peanut butter is prepd. with a content of H_2O amounting to about 10% which serves to expand the starch cells so that segregation of oil is prevented.

Yokoyama, Bunkichi
FRIED RICE FOOD CONTAINING PEANUT FLOUR.
U. S. 1,621,763, March 22.; C.A. 21, P1504, (1927).

Arregui, A. Aguirre

THE NUTRITION OF CATTLE.
Rev. mens. asoc. rural Uruguay No. 7, 85-101(1936); C.A. 30, 8422 (1936).

Av. values for protein, oil, cellulose, P_2O_5, CO_2 and starch contents and for the "ext." value and nutritive ratio are given for natural pasture, foxtail, A. montevidensis, B. inermis, Dilatatum, Andropogom, E. brasilensis, B. unloides, S. cospitosa, Stipa neesiana, E. indica, E. lugenns, P. annal, Sporobulus, B. mayor, S. sciuroides, E. violaceum, L. Tumulentum, P. Mayorm, S. setosa, Dactilo glomerata, M. maculata, M. denticulata, T. repens, S. marianum, C. cardumculus. C. lanceolatum, F. vulgare, O. inermis, M. sativa (alfalfa), A. sativa (oats), H. vulgaris (barley) Lin calel, S. alba, S. nigra, B. vulgaris, C. intybus, S. oleracea, T. acetosa, S. hispanica, B. campestris, Ph. bulbosa, V. vellosa, Caupi, A. hipogea, wild lentil, S. hispida, sweat potato, Zea mays and A. sorgo (sorghum). Various phases of animal nutrition are discussed. Colin W. Whittaker

Burk, L. B.

INFLUENCE OF PEANUT MEAL ON THE QUALITY OF PORK.
Texas Agr. Expt. Sta., Bull. 228, pp. 18 (1918); C.A. 12, 2211 (1918).

This test indicates that when peanut meal is fed with milo chops in the ratio of 1 to 6, the hogs will kill firm. A larger proportion of peanut meal will make oily meat. J. J. Skinner

Burk, L. B.

THE INFLUENCE OF PEANUTS AND RICE BRAN ON THE QUALITY OF PORK.
Texas Agr. Expt. Sta., Bull. 224, pp. 14 (1918); C. A. 12, 2211 (1918).

Peanuts fed to hogs for as long as 40 days produce an oily pork. When fattend on peanuts and finished for 30 days on milo chops and cottonseed meal a firm meat is produced. Rice bran 10 parts, and cottonseed meal 1 part produced an oily meat; feeding 50% of each produced a firm meat. J. J. Skinner

Cajori, F. A.

THE UTILIZATION OF SOME NUTS AS FOOD.
Yale Univ. J. Home Econ. 10, 304-11 (1918); C.A. 13, 348 (1919).

Metabolism expts. on the utilization of the N in protein-rich nuts, and on the utilization of the carbohydrates and proteins of the chestnut, litchi nut and coconut. Various nuts were added to a uniform diet given to men and to dogs. The dietary intake was made sufficient for the calorific needs of the subjects. The "coeff. of digestibility" of the N in the various diets was as follows: almond 84-89, almond paste 88-89, peanut 81-85, peanut paste 90-92, pecan 83-84, pecan paste 81-83, pine 89, English walnut 83, coconut 87-89, litchi 81-82, brazil 88. A basal diet gave 84-90. L. D. Elliott

Daniels, Amy L. and Loughlin, Rosemary.

FEEDING EXPERIMENTS WITH PEANUTS.

J. Biol. Chem. 33, 295-301 (1918); C. A. 12, 838 (1918).

Expts. on rats indicate that the peanut is a valuable food. The protein is adequate for normal growth, maintenance and reproduction. There is a considerable quantity of H_2O-sol. B, for with 56% peanuts in the ration and no other source of this constituent, the rats behave normally. There is a deficiency in certain inorganic constituents (Ca, K, Mg, and S) and in fat-sol. A. Peanut meal, contains some of the hulls, has a better inorganic content. I. Greenwald.

Dowell, S. T.

CHANGE IN THE FAT OF PEANUT-FED RABBITS.

Okla. Expt. Sta. Science 53, 487 (1921); C. A. 15, 2300 (1921).

To det. whether an animal in starving uses the liquid fat more rapidly than it does the solid fat, rabbits were fed on peanuts and alfalfa for 6 weeks, when one of the rabbits was killed; the others were killed after starving 3, 5 and 7 days. Chem. examn. of the fat of the 4 animals showed a progressive decrease in the iodine number of the back fat from 96.23 to 66.22, a decrease in the iodine number of the kidney fat from 98.00 to 92.36, and a progressive increase in the percent of the liver extd. by ether from 8.15 to 20.09. The iodine numbers of the liver exts. remained between 98 and 104. It thus appears that the liquid fat of an animal during starvation is used more rapidly than the solid fat, and that the liquid fat of the back or subcutaneous fat is used more rapidly than that of the kidney. The work is to be repeated using pigs instead of rabbits. L.W.Riggs

Eddy, W. H. and Eckman, Rena S.

THE SUPPLEMENTARY PROTEIN VALUE OF PEANUT FLOUR.

J. Biol. Chem. 55, 119-29 (1923); C.A. 17, 1658 (1923); cf. C. A. 12, 838; 14, 3100.

"When the protein-supplmenting power of peanut flour is compared with that of muscle protein by feeding rations so constituted as to contain only about 10% of protein, 6 to 7% of this protein being contributed by wheat flour and the rest by peanut flour or meat residue, resp., and when these rations are further supplemented with 3% butter fat, 4% salts and brought to nearly equal caloric value per g., the peanut flour proves slightly superior to the meat as a growth producer and markedly superior for promoting reproduction." Rats were used and it was calcd. that an av. of 0.08 g. more protein was eaten each day by those receiving the peanut mixt. than by those receiving the meat mixt. I. G.

Ellis, N. R.

CHANGES IN QUANTITY AND COMPOSITION OF FAT IN HOGS FED A PEANUT RATION FOLLOWED BY A CORN RATION.

U. S. Dept. Agr., Tech. Bull. 368, 1-13 (1933); C.A. 28, 2044 (1934).

Two groups of hogs were compared in a study of the quant. relationship of storage of fat to firmness as influenced by the use of peanuts and of corn in successive feeding periods. A higher rate of fat storage prevailed during the period the hogs were on the peanut ration than when they were on the corn ration. Hogs which continued on the hardening ration until the gains reached multiples ranging from 2 to 5 times the amt. stored on the softening ration generally showed increasing firmness. The gain in total fat was generally more closely related to firmness than the gain in live wt. Analyses of fat samples showed marked decrease in satn. as a result of peanut feeding and an increase in satn. or firmness after the feeding of the corn ration. The addn. of hard fat, formed from the nonfatty constituents of the hardening ration, to the oily fat already formed during the peanut-feeding period produced a gradual hardening of the body fat as a whole. The group of satd. acids replaced linoleic as second to oleic acid when the corn ration was substituted for the peanut ration. W. H. Ross

Ellis, N. R. and Isbell, H. S.

SOFT PORK STUDIES. II. THE INFLUENCE OF THE CHARACTER OF THE RATION UPON THE COMPOSITION OF THE BODY FAT OF HOGS.

J. Biol. Chem., 69, 219-38 (1926); C. A. 20, 3026 (1926); cf. C.A. 20, 617.

The compns. of the oils contained in the rations have a very marked influence on the compn. of the body fat of hogs. When they are fed peanuts and soybeans, the contents of satd. acids, oleic acid and linolic acid of the lard are similar to the content in peanut and soybean oils. On the soybean ration the linolic acid increased from 1.9% in the hard fat from hogs fed brewers' rice to 30.6%. Small amts. of arachidonic acid were found in lard samples representing all kinds of feeds. A decrease in the unsatn. of the fat results from a change from peanuts or soybeans, softening feeds, to corn and tankage, a hardening feed. After long periods on the latter ration, however, the body fat was still less satd. than that of hogs grown on corn and tankage. Corn and soy-bean oils result in greater softening of the fat than peanut and rice oils. The I and refractive index values are excellent measures of firmness of adipose tissue; other fat consts. show less correlation.

Ellis, N. R. and Isbell, H. S.

SOFT PORK STUDIES. III. THE EFFECT OF FOOD FAT UPON BODY FAT, AS SHOWN BY THE SEPARATION OF THE INDIVIDUAL FATTY ACIDS OF THE BODY FAT.

J. Biol. Chem., 69, 239-48, (1926); C.A. 20, 3027 (1926).

"A complete sepn. of the fatty acids was made on 6 samples of fat obtained from as many lots of hogs fed rations varying in fat content. The fatty acids occurring in all samples were oleic, linolic, arachidonic, myristic, palmitic and stearic, the latter 2 in the ratio of 2:1. The feeding of soybeans caused the deposition of small quantities of linolenic acid, while the feeding of peanuts led to the deposition of arachidic acid. A greater likeness was noted between peanut oil and "peanut lard" than between soybean oil and 'soy bean lard'. The fat formed on a ration of brewers' rice and tankage contg. less than 1% fat was very hard. The glycerides of oleic, palmitic and stearic acids composed 97% of the fat."

over

Fraps, G. S.

FEEDING VALUES OF CERTAIN FEEDING STUFFS.
Texas Agr. Expt. Sta., Bull. 245, 29 (1919); C.A. 14, 435 (1920).

A discussion of the compn. and feeding value, based on digestibility, of acorns, alfalfa, bear grass, beet pulp, corn cobs, cotton burrs, cottonseed feed, peanut hulls, peanut hay, peanut meal, rice bran, rice hulls, Rhodes grass, snapweed stem and Spanish moss. Alfalfa hay as feed has about 70% of the value of wheat bran. Bear grass was not relished by stock to a great extent but it has a productive coefficient that compares favorably with other hays. It is tough when dry. Beet pulp has a productive value about 12% greater than wheat bran and about 75% of that of corn chops. Corn cobs fed with cottonseed meal were eaten well. They do not contain any digestible protein but the digestibility of the crude fiber compares favorably with that of hay. Peanut hay has a feeding value of about 28% more than alfalfa hay. Peanut meal containing only 5% crude fiber has a high digestibility. J. J. Skinner

Fraps, G. S., Treichler, Ray and Kemmerer, A. R.

RELATION OF THE CAROTENE CONTENT OF CERTAIN FEED MATERIALS TO THEIR VITAMIN A POTENCY.
J. Agr. Research 53, 713-16 (1936); C.A. 31 1902 (1937).

Seven samples of alfalfa products contg. 7.3-63.5 γ of carotene had a vitamin A potency of 13-77 Sherman-Munsell units per g. with an av. value of 1.4 units per γ of carotene. Five samples of peanut hay ranging from 5.6 to 26.5 γ of carotene per g., 2 samples of yellow corn contg. 1.7 and 2.6 γ of carotene per g., and 1 sample of Johnson grass contg. 9.3 γ of carotene per g. had av. values of 1.3, 1.2 and 1.1 Sherman-Munsell units, resp. One γ of carotene in the international standard had a value of 1.4 Sherman-Munsell units, and 1 of purified carotene had the same value. Carotene in alfalfa products and peanut hay have practically the same vitamin A potency, expressed in Sherman-Munsell units as the carotene in the international standard and in purified carotene dissolved in oil. W.H.Ross

French, M. H.

THE NUTRITIVE VALUE OF LEGUME HAYS.
Ann. Rept. Dept. Vet. Sci. Animal Husbandry, Tanganyika Territ. 1935, 104-7.; C.A. 31, 3967 (1937).

Data are given on the compn. and digestibility by oxen and sheep of East African cowpea and velvet bean hays and peanut tops. The compn. and digestibility of the cowpea and velvet bean hays corresponded with the av. American-grown crops.

Gill, Augustus H. and Vaala, Gordon T.

DO PEANUT-FED HOGS YIELD LARDS CONTAINING ARACHIDIC ACID?
Science 74, 548 (1931); C.A. 26, 1040 (1932).

Lard obtained from peanut-fed hogs was saponf., and the fatty acids were converted into their Me esters. No trace of Me arachidate was found. Rachel Brown

Holmes, A. D.

DIGESTIBILITY OF STEAM-COOKED SOY BEANS AND PEANUTS.
J. Am. Med. Assoc. 74, 798-801 (1920); C.A. 14, 1703 (1920).

The expts with these foods were carried on separately, but the general procedure was the same. The peanuts were shelled, skinned and divided into half kernels. Both beans and peanuts were washed, salted and placed in a pressure cooker under 15 lbs. pressure for 2 hrs., which resulted in thorough cooking. The diet consisted of soy beans or peanuts, bread, butter, sugar, oranges, and tea or coffee, the energy values being 3100 and 3240 cal., resp. Exptl. periods were for 3 days upon 6 subjects 19 to 41 years old who had acequired experience in this type of work. The digestibility of the protein of the soy beans and peanuts was estd. by making correction for the undigested protein remaining from the accessory foods. Results showed 79.9 and 92.5% of the protein of steam-cooked soy beans and peanuts, resp., were digested. Flours prepd. from soy bean or peanut cakes gave 85.3 and 85.8%, resp., of digestible protein. Large amts. of the beans and peanuts, 478 and 457 g., resp., were eaten daily without digestive disturbances. Since fat-sol. A and water-sol. B are present in these foods, it would seem that they are especially valuable for human food as compared with other legumes that have been studied with the same thoroughness. L. W. Riggs

Johns, Carl O. and Finks, A. J.

STUDIES IN NUTRITION. IV. THE NUTRITIVE VALUE OF PEANUT FLOUR AS A SUPPLEMENT TO WHEAT FLOUR.
J. Biol. Chem. 42, 569-79 (1920); C.A. 14, 3100 (1920); cf. C.A. 13, 2906 (1919); 14, 2364 (1920).

"A diet containing bread made from wheat flour ('war flour,' 74% extn.) when fed to albino rats as the only source of protein and H_2O-sol. vitamine, together with an adequate inorg. salt mixt. and butter fat, produced only about 1/3 to 2/3 of normal growth. Bread made from patent flour, which is more commonly used is still poorer food. Bread made with a mixt. of 25 parts of peanut flour and 75 parts of wheat flour furnished adequate proteins and H_2O-sol. vitamine for normal growth. A similar bread containing 15 parts of peanut flour and 85 parts of wheat flour contained proteins and sufficient H_2O-sol. vitamine for growth at very nearly the normal rate. Wheat flour (74% extn.) contains sufficient H_2O-sol. vitamine for the normal growth of albino rats. The protein in the peanut bread were utilized almost twice as well as those contained in the wheat bread." The bread containing from 15 to 25% of peanut flour is very palatable and contains a protein mixt. adequate for normal growth at a cost of less than 1/5 the cost of proteins derived from animal sources. Peanut flour is made by grinding the press cake obtained as a byproduct when shelled peanuts are pressed to produce peanut oil. The press cake has been used as cattle feed and to some extent as a fertilizer because its great value as a human food has not been generally understood. The peanut flour contains about 7% of fat and 50% of proteins, from 4 to 5 times as much as in wheat flour. A.P. Lothrop

Jones, D. B., Finks, A. J. and Johns, C. O.
NUTRITIVE VALUE OF MIXTURES OF PROTEINS FROM CORN AND VARIOUS CONCENTRATES.
J. Agr. Research 24, 971-7 (1923); C.A. 17, 3527 (1923); cf. C.A. 14, 3100 (1920); 15, 2475 (1921).

Mixts. consisting of 25 parts of tomato-seed press cake, soybean flour or peanut flour and 75 parts of yellow corn meal, which contained 12-15% of protein, furnish proteins adequate for the normal growth of albino rats when incorporated in a diet made nutritionally adequate with respect to the dietary factors other than protein. A mixt. of equal parts of corn meal and coconut meal at a protein level of 12% was found efficient for growth at the normal rate. The growth was somewhat subnormal when the proportion of protein was reduced to 9.6%. From expts. in which the mixts. of corn meal and concentrates furnished 7.2% of protein, it is concluded from the gain in wt. per g. of protein consumed that the comparative growth-promoting value of the proteins of tomato seed, peanut and soybean, as a supplement to corn proteins, is in the order: soybean, peanut and tomato seed. W. H. Ross

Kirk, W. G.
DEFICIENCIES OF PEANUTS WHEN USED AS A BASAL RATION.
Fla. Agr. Expt. Sta., Ann. Rept. 1936, 57; C.A. 31, 7476 (1937).

Growing hogs, pregnant and lactating sows fed entirely on peanuts for several months often develop a serious bone condition which results in posterior paralysis. C. R. Fellers

Kline, O. L., Bird, H. R., Elvehjem, C. A. and Hart, E. B.
DISTRIBUTION OF VITAMIN B_4 IN SOME PLANT AND ANIMAL PRODUCTS.
J. Nutrition 12, 455-60 (1936); cf. C. A. 30, 6424; C.A. 31, 2650 (1937

With chicks as exptl. animals, dried grass, peanuts, wheat germ, pork brain and pork kidney were found to be good sources of this factor. The grains examd. were relatively poor sources but white corn and hulled oats were definitely superior to wheat and yellow corn. C. R. Fellers

Mitchell, H. H. and Beadles, Jessie R.
NUTS FAIL AS ADEQUATE SUBSTITUTES FOR MEAT.
Ill. Agr. Expt. Sta., 47th Ann. Rept. 1933-4, 80-2 (1935); C. A. 30, 2232 (1936).

Paired-feeding tests with white rats compared the proteins of pecans, English walnuts and peanuts with those of beef. The peanut contained 49% oil, the walnut 63% and the pecans 71%. After fat extn., the nuts contained 40-60% protein. The protein of the raw peanut was 97.4% digestible; roasted peanut 96.1%; English walnut 84.3%; and pecan 69.5%. Correction was made for the metabolic N found in the feces. Beef protein had a biol. value of 75 as compared with English walnut 56, raw peanut 58, roasted peanut 56 and pecan 75%. The proteins were fed at a 9% level in the rations. As supplemental proteins in the diet of rats, higher values were obtained for the several nuts. C. R. Fellers

Pian, J. H. C.

BIOLOGICAL VALUE OF THE PROTEINS OF MUNG BEAN, PEANUT AND BEAN CURD.
Chinese J. Physiol. 4, 431-6 (1930); C.A. 25, 3378 (1931).

The biol. values, detd. on rats, of the proteins of mung bean (Phaseolus aureus), Chinese peanut (Arachis hypogoea) and curd made from soybean are 58, 59 and 65%, resp., and the coeffs. of digestibility (N absorbed/N intake) 86, 95 and 96%, resp.

Plimmer, Robert H. A., Raymond, Wm. H. and Lowndes, John

EXPERIMENTS ON NUTRITION. IX. COMPARATIVE VITAMIN B VALUES OF FOODSTUFFS. PULSES AND NUTS.
Biochem. J. 23, 546-57 (1929); C.A. 23, 5219 (1929); cf. C.A. 22, 614 (1928).

Material	Percentage amount in diet for maintenance	Relative vitamin B value
Dried yeast	4	100
Split peas	30	13
Whole dried green peas	30	13
Lentils	30	13
Haricot beans	40	10
Soy beans	30	13
Peanuts	20	20
Ground almonds	40	10
Whole almonds	40	10
Hazel nuts	20	20
Coconut	No maintenance	0

Benjamin Harrow

Seekles, L. and Sjollema, B.

ETIOLOGY OF GRASS TETANY. V. REDUCTION OF BLOOD CALCIUM AND MAGNESIUM BY A PLANT SUBSTANCE AND BY WITHDRAWAL OF BLOOD, FASTING AND TISSUE NECROSIS.
Arch. Tierheilk. 68, 583-96 (1935); C.A. 30, 4206 (1936); cf. C.A. 28, 2786 (1934).

In rabbits serum Ca was lowered by blood sampling, fasting or pathol. change. Subcutaneous and oral administration of grass exts. (from meadows on which grass tetany had previously developed) and subcutaneous injection of earthnut exts. lowered the serum Ca level. Some exts. produced a lowering of serum Mg. Fractionation of the exts. did not yield a more highly active fraction. B.C.A.

Sherwood, F. W. and Halverson, J. O.

THE DISTRIBUTION OF VITAMIN B COMPLEX AND ITS COMPONENTS IN THE PEANUT.

J. Agr. Research 44, 849-60 (1932); C.A. 26, 5131 (1932); cf. C.A. 25, 989 (1931).

Commercially blanched peanut splits, hearts and red skins and the corresponding raw products from selected Virginia Runner peanuts were tested for the presence of vitamin B complex by a method which does not differentiate between the components but in general favors the detection of the antineuritic fraction. The raw red skins contain the highest concn. of vitamin B complex but there are appreciable quantities in the hearts and splits. The process of com. blanching destroys a large part of the vitamin in the outer exposed red skins but does not have so marked an effect on that in the hearts and splits. Shelled raw kernels contain relatively much larger amts. of the antineuritic fraction than of the pellagra-preventing vitamin G.

W. H. Ross

Sherwood, F. W. and Halverson, J. O.

THE DISTRIBUTION OF VITAMIN B AND ITS COMPONENTS IN THE PEANUT.

J. Elisha Mitchell Sci. Soc. 46, 14 (1930); C.A. 25, 989 (1931).

Whole raw peanuts are fairly rich in vitamin B and contain less vitamin G. The red skins of the peanuts contain more vitamins than the nut meats proper.

A. L. Mehring

Anonymous

THE FRENCH-OILSEED INDUSTRY.
Bull. Imp. Inst. 15, 576-9 (1917); C.A. 12, 1705 (1918).
The only oil-seeds exported in large quantities from the French colonies are ground nuts, palm kernels and copra. Sesame seed, shea nuts, and cotton seed are also exported in appreciable amts. It is recommended that these nuts be decorticated before shipment, especially where large supplies are being shipped. One ton of ground nuts in shell represents only 0.7 ton in kernels. If prepd. and stored under good conditions, these kernels could be used to prep. an oil of good quality R.L.S.

Ammann, Paul

TREATING EARTHNUTS.
Brit. 416,818, Sept. 21, 1934; C.A. 29, P1174 (1935).
Earthnuts are decorticated and the kernels are then heated, preferably at 80-90°, whereby nitrogenous substances are coagulated and diastases destroyed while the vitamins are preserved. The hot kernels are submitted to pressure to ext. the oil and the cakes offlattened kernels are broken up, the rose-colored skins and debris being removed by a fan and sifting. The kernels are treated with steam and afterward heated to restore them to their original shape. The products are used as a food or in the prepn. of pastry, confectionery or biscuits.

Ammann, Paul

TREATING EARTHNUT KERNELS.
U. S. 2,003,415, June 4; C.A. 29, P4962 (1935) See Brit. 416,818 (C.A. 29, 1174).

Ammann, Paul

PREPARING FOODS FROM EARTH-NUT KERNELS, ETC.
Brit. 461,760, Feb. 24, 1937; C.A. 31, P5894 (1937).
Alimentary substances are prepd. from earth-nut kernels or other edible oleagenous grains or seeds by subjecting the decorticated and uncrushed kernels to intense dessication by heating at about 50-90° to a H_2O content of 1-4%, subjecting to the action of presses for the extn. of the oil, disintegrating the cake thus obtained, removing the skins of the kernels by rubbing and winnowing and milling or grinding the kernels to a flour. The kernels may be coarsely ground and treated with a solvent, e. g., rectified petroleum ether, to remove some of the remaining oil.

Atwell, H. V.

EXTRACTING FATS FROM CACAO POWDER, COTTONSEED OR PEANUT MEAL OR OTHER FAT-BEARING POWDER OF VEGETABLE ORIGIN.
U. S. 1,648,102, Nov.8; C.A. 22, P507 (1928).
The powder is moistened with H_2O in sufficient quantity to form a paste, and the moistened powder is then treated with C_6H_6 or other solvent for the fat. An app. is described.

Barnes, A. Chapman

SOME DRYING PROBLEMS OF TROPICAL AFRICA.

Trans. Inst. Chem. Eng. (London) 6, 177-84 (1928); C.A. 24, 1165 (1930). The conditions obtaining in the harvesting and prepn. (especially drying) for shipment of the following African products are described: ground nuts, palm kernels, copra and cloves. The necessity for improved conditions is emphasized. A lengthy discussion dealing with a variety of materials requiring drying (wool, grass, beet cossettes, etc.), is included. E.G.R. Ardagh

Benotto, Michele

REMOVING ACRID-TASTING AND DARK-COLORED SUBSTANCES FROM SOYBEAN OR PEANUT MATERIAL, ETC.

U. S. 2,101,805, Dec. 7; C.A. 32, P1132 (1938).

The material is treated with a 0.02-0.25% aq. SO_2 soln. and then washed with pure water.

Cellulose et Papiers Soc. de Recherches et D'Applications.

EXTRACTING VEGETABLE OILS.

Brit. 179,191, April 29, 1922; C.A. 16, P3552 (1922).

The extn. of vegetable oils and fats by means of relatively low pressure is effected by humidifying the oleaginous matter before pressing so as to produce cellular exudation of the oil. The desired humidity may be obtained by exposing the material to steam or to atomized water until its wt. has increased by 10-40%. The pressing may be effected while the material is hot or cold, and 1/10 of the pressure employed in the usual process is sufficient. In the case of coconut oil and peanut oil pressures of 5-10 kg. per sq. cm. are suitable. cf. C.A. 16, 3407 (1922).

Compagnie de produits chimiques et electrometallurgiques Alsis, Froges et Camargue and Donnier, Helen H. J.

EXTRACTING OILS BY SOLVENTS.

Brit. 487,366, June 20, 1938; C.A. 32, P9538 (1938).

Prior to extn. of oil from castor seeds, earth nuts or their oil-cakes by trichlorethylene, the seeds, etc., are subjected to the action of heat or a hot fluid, e.g., a current of steam or hot air, to coagulate the mucilaginous matter.

Cross, Wm. E.

PEANUTS: their products and by-products.

Rev. ind. agr. Tucuman 22, 307-10 (1932); C.A. 28, 228 (1934).

A review of the uses of peanuts for human and animal consumption, oil production and the plant as a green manure in crop rotation.

Nelson McKaig, Jr.

Dublyanskaya, N.

THE EFFECT OF THE PRODUCTION-PROCESS ON THE CONSTANTS OF SOME OILS.
Masloboino Zhirovoe Delo 1932, No. 1, 65-8; C.A. 26, 4491 (1932).

The oils perilla, linseed, soybean, sunflower-seed, rape-seed, arachis and castor were prepd. by cold-pressing, extn. with Et_2O and benzine, resp. The consts. of the semi-drying oils show only slight variations. The drying oils obtained by extn. have lower I nos. and higher acidity. The phys. consts. in this group are also affected to some extent by the method of prepn. Castor oil extd. by benzine has a lower sapon. no., because of the incomplete soly. of the glycerides of ricinoleic acid in this solvent. All extds. oils are darker than those obtained by cold pressing. E. Bielouss.

Eddy, C. F.

RECOVERING FATS AND OILS FROM VEGETABLE MATERIALS.
U. S. 1,607,731, Nov. 23.; C.A. 21, P335 (1927).

Press cake of peanuts, castor or soybeans, flaxseed or other oleaginous vegetable material is treated with C_6H_6; acetone or other volatile solvent for fat and oil, the resulting soln. is sepd. from insol. residual material by centrifuging in the presence of added H_2O and both liquid and residue are continuously withdrawn and the solvent is evapd.

Fee, H. A. and Aeveaenes, G. H.

PREPARING COTTONSEED FOR EXTRACTION OF OIL.
U. S. 1,304,670, May 20; C.A. 13, P2141 (1919).

Cotton seed freed from hulls and dust is sprayed with a 5% NaCl soln. in a centrifugal machine until impurities are removed from the seed to such an extent when the seed is dried a pure oil which requires no refining may be obtained by expression. The seed residue, after removal of the oil, may be used as a feed for animals. The same method may be applied to peanut kernel or other seeds and grains.

Felizat, George

THE USE OF OIL CAKES WHICH HAVE BEEN EXTRACTED WITH CARBON DISULFIDE, AS FEED FOR CATTLE.
Chimie & Industrie 2, 407-8 (1919); C.A. 13, 2247 (1919).

The residual meals from the extn. of sesame, peanut, and palm-kernel oils by CS_2 are better feeds for cattle than the corresponding cakes from the hydraulic extn. of these products. This statement is based upon numerous feeding expts. (no details given). It is well known that as CS_2-extd. meals contain almost no oil, they do not become rancid. There is no food value to the free fatty acids of pressed oil cakes and they contain very little undecomposed glycerides. The CS_2-extd. meals being fat-free, are richer in carbohydrates and protein and if the solvent is properly removed, there are no injurious S compds. left in the meal. The steaming of the meal to remove the CS_2 tends to increase its digestibility. H.S.Bailey

Godden, William

THE COMPARATIVE KEEPING QUALITIES OF PALM KERNEL, COCONUT, GROUND NUT AND OTHER OIL CAKES.

Dept. Agr., Univ. Leeds. J. Agr. Science 8, 419-28 (1917); C.A. 12, 508 (1918).

So far as keeping properties are concerned, palm kernel cake compares favorably with most of the oil cakes commonly used on the farm. The only change which occurs during storage under ordinary conditions is an increase in the free fatty acid content of the oil. During incubation at 37°, in a moist state, on only 4 of the cakes examd., namely cottonseed, ground nut, "soycot", and soy cakes, was there any marked development of molds? This development is always accompanied by loss of org. matter, the loss being distributed between the oil and the sol. carbohydrates of the cake. Molds did not develop, during incubation, on cakes from which the oil had been previously extd. To prevent molding, dry storage is essential. When stored under very damp conditions, serious reduction in oil content may take place. A list of 9 citations is appended W. H. Fry

Goldovskii, A. N. and Lishkevich, M. I.

LOCALIZATION OF SOME CHEMICAL CONSTITUENTS IN THE VEGETABLE CELL.

Biokhimiya 3, 9-15 (1938); C.A. 32, 3785 (1938).

The oil from the whole kernels of cotton, sunflower and peanut seeds was removed with a hydraulic press, and analyzed for phosphatides sterols and unsaponifiable lipides. Less than 10% of the phosphatides in the seed is found in the oily fraction. Sterols are distributed equally between the oily fraction and the residue (gel phase). Most of the unsaponifiable lipide is found in the oil. H. Cohen

Hiller, Stanley, and Nibecker, Howard A.

APPARATUS SUITABLE FOR PRESSING OUT OILS AND FATS FROM COTTONSEED, COPRA, FISH MEAL, OFFAL, NUTS, ETC.

U. S. 2,149,736, Mar. 7; C.A. 33, P4450 (1939).

Various details of a continuous rotary screw press.

I. G. Farbenindustrie, A.-G.

EFFECTING CHEMICAL REACTION AND EXTRACTION PROCESSES.

Brit. 457,552, Nov. 25, 1936; C.A. 31, P3173 (1937).

Extn. processes and reactions between components of different phases are effected by subjected the reaction vessel to rapid oscillations of circular or elliptical form with a frequency of some hundreds to some thousands per min. and an amplitude of, e. g., 5mm. App. is described. The invention is applicable to the extn. of bones with benzine or earthnuts with trichlorethylene and to reactions such as sulfonation, nitration, oxidation, reduction, halogenation, alkylation, arylation, mercerization, condensation and to hydrogenation, particularly of C, e.g., lignite. Examples are given of the application of the (1) nitration of pyrene (I), (2) bromination of I, (3) nitration of acenaphthene, (4) formation of a brown product by reaction between 3-aminopyrene, AcONa and tetrachlorobenzoquinone in alc., (5) oxidation of 2,1-naphthoxythionaphthene to 2,1-naphthioindigo, (6) catalytic reduction with H of o-nitroaniline and (7) hydrogenation under pressure of lignite.

Leimdorfer, Joachim

ACID-FREE OILS AND FATS.

Ger. 525,946, Aug. 14, 1928; C.A. 25, P4728 (1931).

The raw material is first treated with NH_3. Neutral oil is then extd. leaving undissolved NH_4 soap. This is warmed to decompose it, and the fatty acid content extd. by a solvent. In the example, ground peanut is treated with NH_3 and water under pressure. The oil is extd., leaving NH_4 soap. This is heated and a 97% yield of fat obtained. See also French Pat. 680,129; C 1930 II, 1629.

Loew, Guglielmo

THE YIELD OF PEANUT OIL AT VARIOUS PRESSURES.

Giorn. chim. ind. applicata 13, 565-8 (1931); C.A. 26, 2074 (1932).

The best results are obtained by expressing the peanuts under a pressure of 200 atm., at 60-65°, with a moisture content of the seeds of 2.5-3%. A. W. Contieri

Moss, W. Wade

PROCESSING THE PEANUT

Food Ind. 8, 123-5 (1936); C.A. 30, 2658 (1936).

The use of ethylene oxide for fumigation of peanuts in the shell is advocated. Coconut oil for toasting (deep-frying) the peanut should have a free fat acid content of less than 0.5% and the sp. gr. should not exceed 0.926 at 15°. The limiting extremes of temp. in toasting are 135-163°. The oil must be changed after every 12-15 batches. Rancidity in toasted peanuts is caused by enzymes as well as by O_2 and light. Lipase must be destroyed by the process to avoid rancidity. A flow sheet is given. C.R. Fellers

Norsworthy, Jr., A. C.

APPARATUS FOR BLEACHING PEANUTS.

U. S. 1,640,849, Aug. 30; C.A. 21, P3402 (1927).

Raghavachari, K.

PRODUCTION AND MARKETING OF GROUNDNUT IN THE MADRAS PRESIDENCY.

Madras Agr. J. 23, 356-62 (1935); C.A. 30, 182 (1936).

When they were stored in cans for 6 weeks, undried groundnut kernels became highly rancid (acid value 101-175) and were subject to attack by fungi and insects. Deterioration in storage was entirely prevented by drying the kernels at steam-oven temps. K.D.J.

Rallis, Jean

THE ACIDIFICATION OF STORED PRESS CAKES.

Bull. mat. grasses inst. colonial Marseille 20, 43-7 (1936); C.A. 30, 4028 (1936).

Data are presented (both tabulated and plotted) on the variation with time of storage of the acidity of the oil extd. with CS_2 from: (1) hot pulp, (2) press cake as removed from the bags coming out of the press, (3) trimmings from the press cakes. All samples were taken in the course of regular com. operation as currently carried out at Marseilles in the production of peanut and castor oils under a pressure of 200 kg. per sq. cm. Owing to variations in conditions (atm. temp. and humidity, conditions of storage, etc.) the results are not of abs. value, but are strictly comparable. In the course of 2 months (a storage period which is frequently reached in com. practice) the acidity can increase from 5- to 10-fold. When the quality (practically, the acidity) of the raw material is known, the age of the press cake can be estd. to within 20%. The oil removed by the press always has a lower acidity than that remaining in the press cake. A. Papineau-Couture.

Rewald, Bruno.

EXTRACTION OF OIL AND LECITHIN FROM SEEDS SUCH AS SOY BEAN, COTTONSEED OR PEANUTS.

U. S. 1,917,734, July 11.; C.A. 27, P4706 (1933).

The comminuted seed material is treated with a composite solvent contg. an aromatic hydrocarbon such as C_6H_6 together with 1-10% of a lower alc. such as MeOH or EtOH and the seed material is subsequently dried in a current of gas such as air at not above 70°. The dried product can be used in cattle feed.

Sato, M., Inaba, T. and Kitagawa, K.

THE ALCOHOL-EXTRACTION PROCESS OF FATTY OILS. I. MUTUAL SOLUBILITIES OF SOME VEGETABLE OILS.

J. Soc. Chem. Ind., Japan 37, Suppl. binding 718-19 (1934); C.A. 29, 1273 (1935).

Soln. temp.-concn. diagrams are presented for mixts. of EtOH with peanut oil, cottonseed oil and sesame oil for EtOH of 90.76, 95.13 and 99.42% concn. The crit. soln. temp. in each case was raised greatly by lowering the concn. of alc.

II. EXTRACTION OF PEANUT OIL.

Ibid. 720.

The extn. app. is pictured and described. The oil yields increased with increasing temp. and alc. concn., but the yield of total extd. matter was not proportional to the oil yield, the concn. of alc. giving the largest amt. of total ext. being lowered by temp. rise. For tech. purposes the concn. of alc. should be kept at about 92% by wt., and the operating temp. at 78°. The quality of the extd. residue was superior to that of ordinary pressed cake in regard to color, smell, moisture and protein content and the extd. oil was almost free from fat acids and very light in color. The exptl. results are given in graphical form. Karl Kammermeyer

Sievers, A. F. and McIntyre, T. D.

THE RELATIVE EFFECTIVENESS OF SEVERAL ORGANIC SOLVENTS FOR THE EXTRACTION OF VEGETABLE OILS.

Cotton Oil Press 4, No. 10, 44-5 (1921); C.A. 15, 1228 (1921).

To ascertain the quality of oil extd. by Et_2O, C_6H_6, CCl_4, C_2HCl_3 and light and heavy gasoline from soy beans, peanuts, corn germs, and cottonseed, such exts. were made and tested. Six portions of a sample of each of the above oil materials were extd. cold with successive quantities of the solvents, the solvents evapd. and steamed out, and the refining loss, free fatty acids and color of the crude, refined, bleached, and deodorized oils detd. With soybeans the free fatty acids were highest in the C_6H_6 ext. and decreased in the following order: C_6H_6, Et_2O, C_2HCl_3, CCl_4, light gasoline, heavy gasoline. The refining loss with heavy gasoline was 8.8 with C_6H_6, 8.5; light gas 8.4; C_2HCl_3 8.3; CCl_4, 7.6; with Et_2O. The free fatty acids of all the peanut exts. were below 0.5%, varying from 0.49 for heavy gasoline to 0.21 with Et_2O. The refining losses were Et_2O, 11.8; heavy gasoline and CCl_4, 3.3; C_2HCl_3 and C_6H_6, 3.2; and light gasoline 2.8. With corn germs the free fatty acids were C_2HCl_3, 2.37; C_6H_6, 2.29; Et_2O, 2.23; light gasoline and CCl_4, 1.90; and heavy gasoline, 1.39. Refining losses on Et_2O ext., 11.1, C_6H_6, 10.7; CCl_4, 10.0; heavy gasoline

9.2; light 8.6; and C_2HCl_3, 7.6. The Et_2O ext. from cottonseed contained 2.61 free fatty acids; C_2HCl_3, 2.01; C_6H_6, 1.78; CCl_4, 1.36; light and heavy gasoline, 1.09. The refining losses were heavy gasoline, 13.5; Et_2O, 13.0; C_6H_6, 10.7; light gasoline, 10.6; CCl_4, 7.9; and C_2HCl_3, 6.7. C_2HCl_3 exts. the most color from soy beans, peanuts and cottonseed, but produces lighter oil from corn germs than either C_6H_6 or heavy or light gasoline. The color of the crude oils is, however, no indication of what may be expected in the refined or bleached oils. With C_2HCl_3, for instance, the crude soy and peanuts exts. were the darkest in each case, but after proper bleaching were nearly the lightest in each set. The extd. peanut oils were, after bleaching, nearly water-white in spite of the fact that the red skins were only partially removed. "It seems that the selection of solvents is almost entirely one of cost and that the question of performance is of secondary consideration." H. S. Bailey

Skipin, A. I. and Pavlov, G.
SUNFLOWER-SEED INTEGUMENT AND ITS INFLUENCE ON THE OIL PROPERTY.
Masloboino Zhirovoe Delo 13, No. 6,5-7 (1937); C.A. 32, 4367 (1938).
Extns. of the cellular integuments of the kernel with Et_2O and petr. ether produced 11% of a viscous, light yellow oil, m. 46.5-7.5°, which differs in its phys. and chem properties from the normal sunflower oil. It contains phosphatides (0.12-0.2% N and 0.055-0.065% P_2O_5), 2% of unsaponifiable matter contg. stearins and no albuminous substances. It is sol. in sunflower oil at above 48°. The soln. at 25° becomes turbid with gradual pptn. of white flakes. Composition of the seed-oil phase A. M. Goldovskii and M. I. Lishkevich. Ibid. 7-8. Substantially identical results were obtained in comparing the compn. of oils extd. from the seed meals and the cellular integuments of the kernels of cottonseed, sunflower and peanut. C.B.

Soc. anon. establissements A. Olier.
APPARATUS AND PROCESS FOR EXTRACTING SOLID MATERIALS, E.G., POWDERED PEANUTS, PALM NUTS, SOY BEANS, COTTONSEED, COPRA.
Brit. 410,301, May 17, 1934; C.A. 34, P6033 (1934).

Soc. Rocca Tassy & de Roux
APPLICATION OF PEANUT AND OTHER OIL CAKE IN THE PREPARATION OF FLOUR FOR HUMAN CONSUMPTION.
Fr. 483,846, Aug. 14, 1917; C.A 12, P963 (1918).
The oil cake is treated with a suitable solvent, such as petroleum ether, and ground for use alone or in admixt. with wheat flour or the like.

Soya Products, Inc.
VEGETABLE MATERIALS.
Fr. 728,594, Dec. 1, 1931; C.A. 26, P6034 (1932).
Soy beans, peanuts, etc., are treated with an oxidizing agent such as an aq. soln. of SO_2 to remove acrid and deeply colored substances.

Spoon, Ir. W.
EXPERIMENTS WITH THE SHIPMENT OF SOME TPOPICAL PRODUCTS CONTAINING OIL IN PRESSED BALES.
Ber. Afdeel. Handelsmuseum Ver. Koloniaal Inst. No. 56, 28 pp. (1930); C.A. 25, 2582 (1931).
With copra the results were satisfactory, there being no loss of the oil and only a small increase in free fatty acid. The results with earth nuts and rubber-seed kernels were very unsatisfactory as both had suffered from the pressing and the percentage of free fatty acids had increased considerably. J. C. Jurrjens

Townsend, C. S. and Lever Bros., Ltd.
OIL FROM PEANUTS.
Brit. 222,975, Dec. 14, 1923; C.A. 19, P1205 (1925).
A portion of the oil is expressed from peanuts by corrugated rollers which may be heated and the pressed kernels may be coated with caramel or salted. The nuts are preliminarily freed from their red skins, immersed in hot H_2O and shaken to split the kernels before passing between the pressing rollers.

Watrous, L. K.
APPARATUS FOR STEAMING GREEN COFFEE, SHELLED PEANUTS, BEANS, PEAS, SMALL GRAIN, ETC.
U. S. 1,498,410, June 17; C.A. 18, P2567 (1924).
The app. is especially adapted for improving coffee.

Woodruff, Maurice D., Mechlin, Wm. H. and Markley, Jonathan
APPARATUS ADAPTED FOR THE CONTINUOUS ROASTING OF COFFEE, CEREALS, PEANUTS, ETC., IN LARGE COMMERCIAL OPERATIONS.
U. S. 2,031,086, Feb. 18; C. A. 30, P2280 (1936).
Various structural, mech. and operative details.

Wyk, J. R. Van and Maude, C.
BLEACHING OF PEANUTS.
Farming in S. Africa 6, 471-2 (1932); C. A. 26, 3309 (1932).
Satisfactory bleaching of discolored peanut shells was obtained by subjecting the whole nut to a brushing action for 5 min. in a 2% soln. of $NaHSO_3$, followed by thorough washing in water. The kernels of the bleached nuts contained a max. of 0.005% $NaHSO_3$, whereas the shells contained a max. of 0.021% calcd. on the total wt. of shell and kernel.
K. D. Jacob.

Baernstein, Harry D.

THE NUTRITIONAL VALUE OF VARIOUS PROTEIN FRACTIONS OF THE PEANUT.
J. Biol. Chem. 122, 781-9 (1938); C.A. 32, 2990 (1938).

Growth is promoted in the white rat by adequate diets contg. 20% of whole defatted peanut, total peanut protein or total peanut globulin at a rate approx. equiv. to that produced by casein. Arachin is a very poor protein for growth but the total globulin, which is approx. 4/5 arachin and 1/5 conarachin, is as effective as casein and conarachi alone is an excellent protein. Arachin contains only 0.54% of methionine and the arachin ration is greatly improved when it is supplemented by methionine and still better growth results if tryptophan is also added. In the absence of methionine supplement neither tryptophan, cystine nor lysine improves an arachin diet. There is apparently a 3rd deficiency in arachin since growth on casein is faster than on a supplemented arachin diet. A. P. Lothrop

Bancroft, Wilder, D., and Barnett, C. E.

PHASE-RULE STUDIES ON THE PROTEINS. I. DETERMINATION OF SOLID COMPOUNDS WITH HYDROGEN CHLORIDE OR AMMONIA.
J. Phys. Chem. 34, 449-98 (1930); C.A. 24, 2151 (1930).

By means of pressure-concn. curves the type of combination which occurs between proteins and NH_3 or HCl was established. Similar expts. were also made with tartaric, succinic, aminoacetic and glutamic acids, tribromoaniline, aniline-HCl and hexamethylenetetramine with NH_3 or HCl. In each case it is possible to show clearly whether a definite chem. compd. is formed. Casein, zein, arachin, fibrin and gliadin absorb NH_3, without the formation of a chem. compd. On the other hand, casein, arachin, fibrin, gliadin and edestin form definite compds with HCl, while zein does not. R. H. Ferguson

Bancroft, Wilder D., and Barnett, C. E.

SOLID PROTEIN HYDROCHLORIDES.
Proc. Natl. Acad. Sci. 16, 118-23 (1930); C.A. 24, 3254 (1930).

Isotherms for the absorption of dry HCl by 6 purified proteins, arachin, edestin, fibrin, gliadin, zein and casein, are detd. The equiv. wts. per atom of N were arachin 280, casein 435, edestin 330-405, fibrin 365 and gliadin 250. The mol. wt. of gliadin must be some multiple of 2250. W. D. Langley

Bancroft, Wilder D., and Barnett, C. E.

ADSORPTION OF AMMONIA BY PROTEINS.
Proc. Natl. Acad. Sci. 16, 135-9 (1930); C.A. 24, 3254 (1930).

NH_3 is adsorbed by the proteins arachin, casein, fibrin, gelatin, gliadin and zein, but in no case is a definite compd. formed. Likewise, it does not react with glycine, but does combine stoichiometrically with p-aminobenzoic, and with glutamic acids. W.D. Langley

Chang, Ke-Chung and Chao, Yung-Sheng
VEGETABLE CASEIN FROM SOYBEAN AND PEANUT.
J. Chinese Chem. Soc. 3, 177-82 (1935); C. A. 29, 5947 (1935).
Soybean and peanut, when defatted and converted to soybean milk and peanut milk, yield on coagulation with HCl 22% and 12% of vegetable casein, resp. Satisfactory adhesive and plastics were prepd. from both materials. Wm. H. Adolph

Chibnall, Albert C., Bailey, Kenneth, and Astbury, Wm. T.
ARTIFICIAL FILAMENTS, FILMS, ETC.
British Patent 467,704 - June 22, 1937; C. A. 31, P8924 (1937).
Threads, films, etc., are obtained by extruding a soln. of a vegetable globular protein, e.g., edestin, ground-nut, soybean or castor-bean globulin, that has been degenerated or denatured and dissolved in an aq. soln. of urea, thiourea, methylurea, other substituted urea or thiourea compd., Na thiocyanate, Na salicylate, formamide, acetamide, or urethan or other lower alkyl ester of aminoformic acid. Protective colloids or dispersing agents may be present in the protein solns. The solns. may be rendered more stable and the viscosity may be controlled by addn. of a small proportion of glyoxal polymer (I), CH_2O, BzH, ethylene oxide, glycide, salicylic acid, gelatin, acetophenone, triacetin, sorbitol (II), glycerol (III), polyglycols, glucose, triethanolamine and, if not already present, thiourea. These addnl. substances may also be added to the coagulating bath or to a subsequent treatment bath. If desired, the protein may be denatured or degenerated before the process of soln. but in such case the use of a protective colloid or dispersing agent may be necessary to effect soln. The diluent or regenerating medium into which the solns. are extruded may be H_2O, dil. aq. solns. of $(NH_4)_2SO_4$, Na_2SO_4 or Na_2SO_3, or other liquid. Small quantities of H_2SO_4, AcOH, $ZnCl_2$, glycerol or sorbitol are preferably added to the regenerating liquid. The products may be strengthened by immersion in solns. of CH_2O, dichromate, chrome alum, potash alum, $Al_2(SO_4)_3$, $AlCl_3$, tannin or picric acid. The softness can be enhanced by treatment with solns. of waxes in oils or alc. Among examples, groundnut seed globulin, urea, thiourea and II are ground together and then mixed with a soln. of gelatin, I and H_2O until dissolved, the soln. is filtered, centrifuged, ripened and extruded into a warm soln. of $(NH_4)_2SO_4$, $ZnCl_2$, H_2SO_4, III and H_2O and the filaments obtained are treated with a soln. of III and II in H_2O and then with a soln. of CH_2O. In Brit. 467,812, June 22, 1937, divided on 467,704, filaments, etc., are obtained by extruding a soln. of casein in aq. urea soln through an orifice into a diluent or other regenerating medium.

Dowell, C. T. and Menaul, Paul.

NITROGEN DISTRIBUTION OF THE PROTEINS EXTRACTED BY DILUTE ALKALI FROM PECANS, PEANUTS, KAFIR, AND ALFALFA.

Okla. Agr. Expt. Sta., J. Biol. Chem. 46, 437-41 (1921); C. A. 15, 2450 (1921).

"Advantage has been taken of the fact that all proteins are sol. in basic soln. to sep. them from the other substances in foods and feeds which make it impractical to apply the Van Slyke method to det, the N distribution. It was found that the proteins of pecans and peanuts could be extd. practically completely by dil. solns. of NaOH and $Ba(OH)_2$, and pptd. from the alk. soln. with AcOH. In the case of kafir and alfalfa the extn. was not so complete nor were the pptd. proteins as pure as in the case of pecans and peanuts. However, since all the proteins were sol. in alkali, it seems reasonable to suppose, that if the material was finely ground, the part of the proteins which was extd. was a respresentative sample of the total. It would seem that it is much more important to det. the amino-acid compn. of a food or feed than it is to isolate and analyze their individual proteins." The following av. % distribution of N was found in the proteins of pecans, peanuts, alfalfa and kafir, resp., humin 5.58, 1.2, 7.8, 4.4; arginine 23.39, 17.57, 11.01, 2.41; histidine 3.96, 1.88, 6.26, 1.78; lysine 5.62, 6.22, 5.26, 1.05; cystine 0.8, 0.77, 0.85, 0.96; monoamino N 52.1, 61.25, 53.53, 74.95; humin 5.58, 1.2, 7.8, 4.4. In the case of kafir the best solvent was found to be a 0.5% soln. of NaOH in 70% alc. In the case of the substances mentioned, extn. of the proteins with dil. alk. solns. makes it possible to det. the amino-acid compn. correctly by means of the Van Slyke method, but further work is necessary to det, whether such a procedure can be applied to all classes of food and feed substances. A. P. Lothrop

Felix, K.

THE RELATION OF THE FREE AMINO GROUPS TO THE LYSINE CONTENT OF PROTEINS.

Z. physiol. Chem. 110, 217-28 (1920); C.A. 15, 1730 (1921).

F. estd. the N titratable with formalin in hydrolyzed and non-hydrolyzed arachin, glycinin, and gelatin. The fraction which is pptd. by phosphotungstic acid after removal of other diamino acids contains some other nitrogenous substances besides lysine. Van Slyke's assertion that the free amino groups of non-hydrolyzed protein conta in 1/2 of the N of the lysine is not justified. H.V.Atkinson

Fernandez, Obdulio and Pizarroso, A.

ENZYMES OF OIL-BEARING SEEDS; LIPASE. II.

Anales soc. espan. fis. quim. 15, 138-46 (1917); C.A. 11, 3280 (1917).

F. and P. studied the action of the lipase of almonds, hazelnuts, peanuts, walnuts, corn, pine kernels, castor oil beans and poppy and hemp seeds on castor oil and triacetin. The oil was neutralized with NaOH and emulsified with a little H_2O and seed tissue (from which fat had been extd.) containing the lipase. Acidity was then detd. after 24 and 48 hrs. by means of a 0.2 N NaOH soln. (after previous diln. with a mixt. of 25 cc. EtOH and 25 cc. Et_2O). Lactic acid and $MnSO_4$ were used activating the zymogen. The lipase of the seeds studied was very slightly sol. in 1.5 N NaCl soln. (Falk procedure); the ppt. formed on dialysis showed only slight hydrolytic action towards fats. Comparison of the action of 1 g. seed material (pressed for removal of oil and then washed with Et_2O), 2 g. castor oil and 5 cc. of 1:100 lactic acid for 24 and 48 hours at 35° with that of 1 g. of seed material, 2 g. castor oil and 10 cc. of 1:100 lactic acid soln. under the same conditions of time and temp. showed that castor bean lipase was the most active. The values obtained after 48 hrs. differed only slightly from thos obtained after 24 hrs. Increase in the amt. of lactic acid intensified the lipolytic action of poppy and hemp seed and slightly diminished that of peanuts; the lipolytic action of the walnut and hazelnut was diminished somewhat during the 1st 24 hrs. with increased lactic acid content, but this retarding influence was not observable after 48 hrs. Expts. with 1 g. seed material, 2 g. castor oil and 10 cc. of 4:1000 $MnSO_4$ soln. for 24 and 48 hrs. at 35° showed that in the case of certain seeds (notably hazlenuts, peanuts and corn) Mn intensified the lipolytic action more than lactic acid. Mn in varying amt. was present in all the seeds. Expts. with 1 g. seed material, 2 g. castor oil, 5 cc. of 1:100 lactic acid soln. and 5 cc. of 4:1000 $MnSO_4$ soln. and other expts. in which the amts. of lactic acid and $MnSO_4$ were doubled showed that, except in the case of poppy seed, the presence of 2 zymogen activators was not as favorable for development of lipolytic action as the presence of only 1 activator. Study of the action of 2 g. seed material on 0.50 g. triacetin at 35° with and without the presence of 10 cc. of 4:1000 $MnSO_4$ soln. or 10 cc. of 1:100 lactic acid soln. showed that Mn was a better zymogen activator than lactic acid in the case of poppy seed, almonds, hazlenuts, peanuts, corn and walnuts. Except in the case of castor beans hydrolytic action was more pronounced towards triacetin than towards castor oil. It is possible, in view of the larger amt. of enzyme used with triacetin, that this result is somewhat dependent on the mass-action law; it is probable, however, that the difference is due to a greater extent to difference in mol. wt. and solv. in H_2O of the 2 substances to be hydrolyzed. This view, if correct, would contradict the idea that phytolipases, contrary to zoolipases, show greater activity toward esters of higher mol. wt. H.S. Paine

Johns, C. O.

THE PROTEINS OF THE PEANUT.

Cotton Oil Press 2, No. 12, 41-2(1919); C.A. 13, 3249 (1919).

"While it has not been possible to det. quant. all the different constituents of proteins, analyses show considerable about their nutritive value. During digestion, proteins are broken down into about 16 amino acids which in the body are formed into new proteins. The value of a protein depends on the relative quantities of the various amino acids it gives when digested; some proteins lack entirely those amino acids necessary for growth and will not support life. The peanut proteins contain all the amino acids necessary for growth and are, therefore, valuable to supplement the cereals which are deficient in certain essential substances. This point has been proved by feeding white rats with peanut press cake as the only source of protein, and ascertaining that they grew normally. Nutrition expts. at the Bureau of Chemistry with peanut flour made from peanut oil press cake, free from shells, mixed in the proportion of 1:3 with 75% extn. wheat flour resulted in normal growth, while control animals fed with the same ration without the peanut flour grew very little. Peanuts are not difficult to digest either in the form of flour or butter, but are a very concd. food, 1 lb. containing sufficient energy (2500 cal.) for a normal person for 24 hrs. The ingredients of the peanut have the following digestibility coeffs.: Protein 89, fat 96, carbohydrates 97." Cf. C. A. 13, 847, 1723.

Johns, Carl O. and Jones, D. B.

THE PROTEINS OF THE PEANUT, ARACHIS HYPOGEA. I. THE GLOBULINS ARACHIN AND CONARACHIN.

U. S. Dept. Agric. J., Biol. Chem. 28, 77-87(1916); C.A. 11, 466 (1917).

Two globulins, arachin and conarachin, were isolated from the peanut. The former contains 0.4% S and 4.96% basic N; the latter, 1.09% S and 6.55% basic N. This is the highest value recorded for basic N in any seed protein. It is possible that peanut press-cake may, therefore, be highly effective in supplementing food products made from cereals and other seeds whose proteins are deficient in basic amino acids. 500 g. oil-free meal were extd. with 2.5 l. of 10% NaCl soln., filter paper pulp was added to a thick pulp and the mixt. thoroughly pressed. The liquid obtained was filtered clear and the arachin ppted. by the addition of $(NH_4)_2SO_4$ to 0.2 satn. After filtering out, it was dissolved in 10% NaCl and dialyzed. The ppted globulin was filtered out, washed with EtOH and Et_2O and dried in vacuo. The filtrate from the arachin was either completely satd. with $(NH_4)_2SO_4$ and the ppt. dialyzed or it was dialyzed directly. Either method yielded a small amt. of conarachin. The NaCl exts. also contained a small amt. of an albumin, coagulating at 65-70°C.

Johns, Carl O., and Jones, D. Breese.
THE PROTEINS OF THE PEANUT, ARACHIS HYPOGAEA. II. THE DISTRIBUTION OF THE BASIC NITROGEN IN THE GLOBULINS, ARACHIN AND CONARACHIN.
J. Biol. Chem. 30, 33-8 (1917); C.A. 11, 2817 (1917); cf. C.A. 11, 466,(1917)

The % of basic amino acids in the globulins of the peanut has been detd. by the VanSlyke method, the amts. found being as follows for arachin and conarachin, resp.: arginine 13.51 and 14.60; histidine, 1.88 and 1.83; lysine, 4.98 and 6.04; and cystine, 0.85 and 1.07; both proteins also gave a strong qual. test for tryptophan. The % of lysine is relatively high and approaches the lysine content of muscle. Foods deficient in this essential amino acid such as wheat and corn can well be supplemented with peanut meal, resulting in a considerable saving in the cost of feeding and a better utilization of those grains. Animals fed on it thrive and increase rapidly in wt. and it seems to possess no objectionable properties. The press cake ground to a meal contains about 28% of protein when made from whole peanuts and about 45% when made from shelled peanuts. For human consumption in a mixt. of 75% of wheat flour and 25% of peanut flour makes excellent bread which is higher in protein and lysine content than bread made from wheat alone.

Johns, Carl O. and Jones, D. Breese.
THE PROTEINS OF THE PEANUT, ARACHIS HYPOGAEA. III. THE HYDROLYSIS OF ARACHIN.
U. S. Dept. Agr., Bur. Chem.,J. Biol. Chem. 36, 491-500(1918); C.A. 13. 847 (1919).

Arachin, the principal protein in the peanut, Arachis hypogaea, yields on hydrolysis the following % of the various amino acids: glycine, 0.00; alanine, 4.11; valine, 1.13; leucine, 3.88; proline, 1.37; phenylalanine, 2.6; aspartic acid, 5.25; glutamic acid, 18.69; tyrosine, 3.5; cystine, 0.85; arginine, 13.51; histidine, 1.88; lysine, 4.98; tryptophan, present; NH_3 2.03; total, 63.78. The % of the basic amino acids was detd. by Van Slyke's method as well as by the direct method of Kossel and Kutscher and the values obtained by both methods agreed closely. More lysine was obtained by the former method than could be isolated by the direct method.

Jones, D. Breese, Gersdorff, C. E. F. and Moeller, O.
THE TRYPTOPHAN AND CYSTINE CONTENT OF VARIOUS PROTEINS.
J. Biol. Chem. 62, 183-95(1924); C.A. 19, 2062 (1925).

The substances exmd. included the following: proteins from Chinese velvet, Georgia velvet, mung, navy, adsuki, lima, soy, kidney and Jack beans; buckwheat; tomato, squash and canteloupe seeds; kafir; wheat bran; coconut; cohune nut; peanut; palm kernel, vignin from the cow pea; legumin and vicilin from the pea and lentil; edestin from hempseed; sunflower seed globulin; castor bean proteins; cottonseed and flaxseed globulins, zein from maize; globulins from the Brazil nut, walnut, almond and filbert; proteins from the hen egg; muscle of the ox and halibut; prolamins from einkorn, spelt, emmer, sorghum, teosinite, barley, rye, maize, wheat, and kafir; fibrin; casein; spinach and alfalfa proteins; Witte peptone; blood albumin; wheat gliadin. The tryptophan content of wheat bran albumin, 4.76%, is the highest of that of any plant protein hiterto reported; the globulin also contains 2.85% and these proteins are also high in cystine. These figures are significant from the standpoint of their nutritive value. In general α-globulins are characterized by a higher content of tryptophan and cystine than the β-globulins. No vegetable globulin is free from tryptophan except the β-globulin of the Georgia velvet bean. About 4% of cystine was found in lactalbumin. The high regard in which the proteins of the oil seeds, such as flaxseed, cottonseed, hempseed, and nuts, are held is further justified by their tryptophan content.

Jones, D. Breese and Horn, Millard J.
THE PROPERTIES OF ARACHIN AND CONARACHIN AND THE PROPORTIONATE OCCURRENCE OF THESE PROTEINS IN THE PEANUT.
J. Agr. Research 40, 673-82; Chem. News 141, 38-40, 56-9 (1930); C.A. 24. 4533 (1930); cf. C.A. 11, 466, 2817; 13, 847.

Oil-free meal obtained by Et_2O extn. of finely ground shelled Virginia peanuts Contained 7.36% N, equiv. to 40.48% of crude protein. An extn. of the oil-free meal with 10% NaCl soln. removed 86% of the total N in the meal. The only globulins in peanut meal are arachin and conarachin, which amount to 25 and 8% resp., of the oil-free meal. Arachin does not coagulate in a 10% NaCl soln. even at the boiling temp. of the soln. It has $(a)_D^{20}$ - 39.5°, and ppts. completely from its NaCl soln. at 40% Satn. with $(NH_4)_2SO_4$. Conarachin coagulates at 80°. It has $(a)_D^{20}$ - 42.7°, and is pptd. at 85% satn. with $(NH_4)_2SO_4$. Arachin in 10% NaCl soln. is practically completely pptd. by CCl_3COOH, tannic or tungstic acids. Amino acids, if present, do not come down with the arachin. In the presence of peptone, CCl_3COOH ppts. all of the arachin but none of the peptone; tannic acid ppts. 39.13%, and tungstic acid 44.66% of the peptone N in addn. to the arachin when both are present in 10% NaCl soln. No evidence was obtained showing the presence in peanuts of significant quantities of albumin, prolamine or glutelin.

Jones, D. B. and Waterman, H. C.
STUDIES ON THE DIGESTIBILITY OF PROTEINS IN VITRO. III. THE CHEMICAL NATURE OF THE NUTRITIONAL DEFICIENCIES OF ARACHIN.
J. Biol. Chem. 52, 357-62(1922); C. A. 16, 2713 (1922).

Arachin, raw or cooked, even at 15 lbs. pressure for 1 hr., or isolated without the use of EtOH or Et_2O or of high temps., was less readily digested by pepsin and trypsin, in vitro, than other biologically available proteins. Under the same conditions, arachin was 48% digested as against 58% for cooked phaseolin and 61% for casein. By heating arachin with 20 vols. of 0.1 N NaOH at 80° for 1 hr. and then pptg. with acid, a prepn. was obtained which amounted to about 1/3 the wt. of arachin taken but which contained 2/3 the total histidine, 2/3 total arginine and 2/5 total lysine. Under the condition used for testing arachin and the other proteins, only 24% was digested. The failure of arachin to act as a biologically complete protein may be due to the existence of difficulty broken linkages between essential amino acids.

Kotasthane, W. V. and Narayana, N.
THE PROTEINS OF GROUNDNUT (PEANUT) ARACHIS HYPOGAEA, LINN.
Proc. Indian Acad. Sci., Sec. B., 376-86(1937); C.A. 32, 3042 (1938).

Analyses were made of the proteins in the local (India) and Spanish peanut. On the whole, the data show no appreciable difference in their compn., including a comparison with the Virginia grown in America. Detns. were made of arginine, histidine, lysine, cystine, tyrosine and tryptophan.

Laucks, Irving F.
PEANUT FLOUR FOR THE MANUFACTURE OF ADHESIVES.
U. S. 1,942,109. Jan. 2; C.A. 28, P1824 (1934).

An oil-free peanut flour is prepd. the protein of which is at least partially coagulated by heat, and this flour is used with an alk. aq. dispersion medium such as one formed with lime and soda to prep. an adhesive of good viscosity, water resistance and strength.

Leoncini, G.

ENZYMES HYDROLYZING GLUCOSIDES IN SOME SEEDS.

Boll. ist. super. agrar. Pisa 7, 603-17(1931); C. A. 26, 4626 (1932).

Enzymes hydrolyzing arbutin, salicin and phlorhizin were found in the seeds of aconite, hemp, buckwheat, castor beans, peanuts, nasturtium, sage, althaea wheat, beets, vetch and barley. Several of these enzymes are able to hydrolyze both swollen and dormant seeds.

Lichnikov, I. S.

SEPARATION AND HYDROLYSIS OF ALBUMINOUS SUBSTANCES FROM THE SEEDS OF ARACHIS HYPOGEA.

Iz Rezul't Veget Opytov Lab. Rabot (Rec. Trav. Lab. Agron.) 9, 378-85(1913); Expt. Sta. Rec. 35, 712; C. A. 11 1673 (1917).

Proteins from the seeds of A. hypogea were extd. by means of water, 70% alc., a 10% soln. of NaCL, and a 0.25% soln. of KOH. The total amt. of N in the seeds was found to be 9.1%, of which as much as 8.74% occurred as albuminous substance, including albumin, glutin, and globulin. Glutin and globulin were hydrolyzed with the subsequent sepn. of histidine, arginine and lysine. The work and the methods employed are described in detail.

O'Hara, L. P. and Saunders, Felix.

PROTEINS. VI. SOLUBILITY OF THE NITROGENOUS CONSTITUENTS OF CERTAIN SEEDS IN SODIUM CHLORIDE SOLUTIONS.

J. Am. Chem. Soc. 59, 352-4(1937); C. A. 31, 2243 (1937).

The amt. of N material extd. from flaxseed, orangeseed, peanut and rye meals by satd. solns. is almost as large as that extd. by N solns. In those seed meals for which this conclusion is valid, the material which is extd. appears to consist almost wholly of a cryst. or semicryst. protein having the characteristics of a globulin. When a soln. of given concn. is used for the extn. of N material, a marked temp. coeff. is found; with 4 N NaCL: 39.7°, 48.65%; 26°, 41.43%; -2.5°, 35.92%. The ordinary textbook definitions of globulins do not adequately consider the soly. properties of these compds. Data are given for concns. of NaCL from 0.125 N to satn.

Ritthausen, H.

CONCERNING THE PROTEINS OF VARIOUS OILSEEDS.

Pfluger's Arch. 21. 81-104. 7. Febr. Königsberg; C 1880, 230.

(Abstract translated from the German by J. R. Loeb and M. J. Morris)

The following seeds were examined: peanut (Arachis hypogaea), sunflower (Helianthus annuus), sesame (Press cake from Sesamum indicum), coconut, rape (Brassica Napus), also potato. From the results the author emphasizes especially:

1. The proteins obtained by solution in water with the addition of small quantities of potash, baryta - or lime water show in their composition no essential difference from those prepared by means of sodium chloride solution or solutions of calcium, barium, magnesium, potassium, or ammonium chloride. The investigation of Barbieri on the protein of pumpkin seed led to the same result. Without doubt the alkali and alkaline earth hydroxides act in these cases as a base on an acid, forming water soluble potassium,

sodium, ammonium, calcium, etc., compounds of the protein, which contain them undecomposed and separable completely unchanged by neutralization with an acid. This gives hope that in time a useful general formula for these substances may be developed as Lieberkühn has already developed for albumin.

2. Nitrogen rich proteins with nitrogen contents of more than 18% and in composition similar or analogous to the conglutin of lupines and almonds are very widespread among oil seeds. They have been identified in bitter and sweet almonds (Amygdalus communis), brazil nuts (Bertholletia excelsa), castor beans (Ric. communis), pumpkin seed, sunflower seed (Helianthus annuus), peanuts (Arachis hypogaea), sesame seed (Ses. indicum), coconuts (Cocus nucifera) and by Dumas and Cahaurs also in white mustard as well as in hazelnuts. Various of these seeds contain only these proteins (almonds, peanuts, brazil nuts, pumpkin seed, sunflower seed), while in others, besides these, substances with a lower content of nitrogen occur (castor beans, sesame seed, and coconuts). In rape or turnipseed (Brassica Napus) they are detectable and without doubt are not even contained therein.

That their occurrence in the seed in close relation is responsible for the frequently observed systems, indicated by Pfetter as proteins, and the crystalloids, so that the presence of the latter at the same time indicates the existence of the former, is indeed highly probable however not proved conclusively.

3. Since all the seeds investigated by the author contain at most only small amounts of nitrogen compounds other than proteins, the theory that all of the nitrogen is existing only in the form of protein, if not proved, is indicated.

4. Since for a considerable number of seeds the occurrence of conglutin-like or similar complex protein substances with a content of more than 18% nitrogen has been established, for these seeds or their press cakes used for stock feed it must be considered necessary to give up the as yet customary calculation of proteins from the nitrogen content found by analysis by multiplication by 6.25, which assumes the content of 16% nitrogen in the protein and to replace it by the calculation with the factor 5.5 or N x 5.5, which corresponds to the nitrogen content of 18.17%. Calculated in the customary manner, for example, the amount of protein in the press cake having 7.82% nitrogen is found to be 48.87% while in reality it contains only 43.01% protein; thus the protein content would accordingly be found too high by almost 6%.

The author in his paper, "The Proteins of Cereals, Legumes, and Oil-seeds", published in 1872, verified the necessity of a modification of the customary calculation of protein (p. 236-37), and he also verified for all seeds of the cereals and legumes that none of the proteins contain less than 16.66% N, that the multiplication factor 6 is to be used and only by this calculation can an approximately correct value be obtained, however, this proposal has found little consideration and one calculates today afterward as before with the inadmissible number 6.25. However since the investigations of others (Sachsse, Barbieri, Weyl) have given results similar to those obtained by the author for conglutin of lupin and almonds, in these cases one could now indeed remove the requirement that proposed the customary method of calculation and use the more nearly correct method.

5. The nitrogen rich proteins, so far as they have been established and investigated, all, with the exception of gliadin and the proteins occurring in the brazil nut, contain less carbon than animal protein and casein; the difference amounts to 1.5 to 2% in gliadin and brazil nut protein, always to 1%.

Therewith and with the detection of up to more than 2% higher nitrogen content, the difference must be proven with a larger number of animal proteins for sufficiency.

6. The sulfur content of these substances varies from 0.35% (for peanuts) to 1.37% (for sesame); it shows accordingly here the same difference, which was already found by the investigation of conglutin of the lupin, 0.91%, and the almond, 0.40-0.45%, so that between one poor in sulphur, 0.4-0.5% S, and one richer in it, there must be a 1% difference in range. The peanut protein is similar to the conglutin of almond, the proteins of sesame, sunflower, coconut to that of lupin. The high sulfur content of the substance prepared from sesame seed by means of warm sodium chloride solution, 2.34%, never previously observed in proteins, the author was able to explain only by assuming a mixture of sulfur rich substances. Possibly there are also proteins with as high or higher contents of sulfur.

7. The author characterized the proteins previously prepared from lupin and almonds by the similarity of their composition to that of gliadin, the constituent of wheat gluten or gluten, signified by the name conglutin, and it is now the opinion that there is no sufficient reason to exchange this designation for that which Th. Weyl suggested.

Since the preparations obtained up until now from the different seeds, with the exception of that of the brazil nut, do not vary much in their composition from each other and from that of conglutin, it must appear suitable that they be designated entirely conglutin. The composition of the proteins investigated is as follows:

Prepared by means of potassium hydroxide sol'n.

	Peanut	Sunflower	Sesame
C =	51.52	51.38	52.08
H =	6.71	6.66	6.81
N =	18.13	17.99	17.86
S =	0.55	0.71	1.19
O =	23.19	22.76	22.06

Prepared by means of sodium chloride sol'n.

	Peanut	Sunflower	Sesame	Coconut
C =	51.40	51.51	51.19	50.86
H =	6.64	6.76	7.15	6.82
N =	18.10	18.21	18.38	17.87
S =	0.58	0.61	1.40	1.03
O =	23.28	22.91	21.88	23.40

Sandstrom, Wm. M.

PHYSIOCHEMICAL STUDIES ON PROTEINS. IV. A COMPARATIVE STUDY OF THE ACID- AND ALKALI-BINDING OF NATIVE AND DEAMINIZED PROTEINS.

J. Phys. Chem. 34, 1071-1101(1930); C. A. 24, 3252 (1930); cf. C. A. 23, 614

Edestin, arachin and the globulin of the cantaloupe seed were prepd. and analyzed for their N distribution by the method of Van Slyke. Edestin, arachin, casein, fibrin and durumin were deaminized by addn. of AcOH and $NaNO_2$. The N distribution of the resulting products was detd. The free amino group of lysine is attacked by the HNO_2 with the result that the lysine fraction is lost to the phosphotungstic acid fraction. The acid- and alkali-binding capacities of the proteins were detd. at various concns. of acid and

of alkali by a potentiometric method. The quantity of acid bound by each of the proteins except edestin is roughly proportional to the lysine content of the proteins. It is postulated that some basic group other than the e- amino group of lysine must be responsible for the acid-binding capacity of edestin. For all 5 proteins studied the acid-binding capacity is greatly decreased when the proteins are deaminized. In 4 of the 5 cases it was found that the quantity of NaOH bound at $_{pH}$ 10.5 by the deaminized products was greater than that by the untreated proteins. The plots of the logarighms of the amt. of acid bound by the proteins against the logarithms of the final equil. acid concn. indicate that the data fit the empirically derived Freundlich adsorption isotherm.

Conclusion: In the regions studied the acid- and alkali-binding are typical adsorption phenomena.

Sure, Barnett

AMINO- ACIDS IN NUTRITION. I. - STUDIES ON PROLINE A GROWTH-LIMITING FACTOR IN ARACHIN (GLOBULIN FROM THE PEANUT)?

Univ. Wis. J. Biol. Chem. 43, 443-56(1920); C. A. 14, 3705 (1920).

Arachin, a globulin from the peanut, contains 1.37% of proline, the lowest amt. in any protein yet reported, and has been used in a study of the synthetic cap. of the animal cell for the pyrrole nucleus as found in proline. Preline is not the growth-limiting factor in arachin as it is supplemented by neither gelatin nor zein, both of which are rich in that amino-acid. Negative results were also obtained when cystine (1%) and tryptophan (2.5%) were added te the diet. "Although arachin contains in quantity all the amino-acids believed to be necessary for the construction of mammalian body tissue, it was found inadequate for maintaining growth in the rat. For this apparent inconsistency between chem. and biological tests there is no explanation at present." The suggestion is offered "that the deficient character of arachin is to be attributed to its stereochem. rather than to its chem. compn. It is quite possible that the chem. structure of a protein may be such that after digestion certain of the simple peptides containing some amino-acid essential for the construction of body tissue escape further cleavage and present themselves in a form unacceptable for assimilation into body tissue." Arachin is not supplemented by the globulin, conarachin, which is associated with it, but the peanut must contain some other proteins that supplement arachin as the total proteins of the peanut have been shown to be satisfactory for growth.

White, Abraham and Eliot F. Beach

THE ROLE OF CYSTINE, METHIONINE AND HOMOCYSTINE IN THE NUTRITION OF THE RAT.

J. Biol. Chem. 122, 219-26(1937); C. A. 32, 1305 (1938).

Confirmatory evidence of the indispensability of methionine in nutrition (demonstrated by Rose, C. A. 31, 863?) by the use of a diet contg. mixts. of highly purified amino acids) has been obtained by a very different method of exptl. approach. Rats were fed a diet in which the protein component was arachin which contains a considerable amt. of cystine but has a methionine content of 0.5%, the lowest amt. of this amino acid found in any protein thus far analyzed. This diet was incapable of supporting good growth in young rats but was made nutritionally adequate by supplementing it with methionine or with homocystine which may function in promoting growth by being transformed into methionine by the animal organism. No growth stimulation was produced by the addn. of cystine to the basal diet. The nutritional inadequacy of arachin cannot be attributed to its indigestibility as has previously been suggested.

Analysis

Barrow, E. R.
REPORT OF THE A. O. C. S. COMMITTEE ON SAMPLING COTTONSEED, CAKE, HULLS, LINT AND OIL, PEANUTS, SOY BEANS, COPRA AND THEIR OILS.
Cotton Oil Press 4, No. 3, 87-88(1920); C. A. 14, 3327 (1920).
Recommendations for official methods of sampling numerous oil seeds and vegetable oils are given in detail.

Bilteryst
DETECTION OF ARACHIS MEAL AND ARACHIS CAKE IN CHOCOLATE.
J. Pharm., 1897, (vi), 6, 29-30; B. A. 1897, ii, 529.
The examination may be made either microscopically or chemically. In the latter case, the fatty matter is extracted with carbon tetrachloride, and its refractive index determined in a Jean and Amagat's oleorefractometer. The index for cocoa fat is -19°, whilst for arachis it is + 3°. A mixture containing 5 per cent. of arachis has an index -- 18°, and one containing 50 per cent. and index of - 7°. This test can be supplemented by the determination of the proteids present, since chocolate contains 9, cocoa 18, arachis meal 20, and arachis cake about 45--47 per cent. of proteids.

Bolle, J.
FEEDING STUFFS
Rep't Agr. Chem. Sta., Görz, for 1909. Z. landw. Versuchsw., 13, 289-91; C. A. 4, 2013 (1910).
The following variations in fat and protein were noted: Sesame cake: fat, 5.8-17.8%; protein, 37.4-41.8. Peanut cake: fat, 5.4-15.8; protein, 37.6-46.0. Coconut cake: fat, 6.0-10.9; protein, 19.8-20.9. Linseed cake: fat, 5.6-10.8; protein, 0.0; cottonseed cake: fat, 4.2-7.0; protein, 19.6-24.0. Grapevine cuttings (cut in fall of year) are used as feeding-stuffs and compare with ordinary hay in comp. as follows: Vine cuttings: water 30.9, fat 0.84, protein 3.5, ash 2.6. Hay: water 14.5, fat 2.30, protein 9.5, ash 6.0. The comp. of dean and sun-dried grasshoppers follows: water 10.4-11.1, fat 5.6-7.7, ash 4.2-9.9, protein 49-60%. This shows them to be eq ual to conc. feeding-stuffs. They are also 5-6 times richer than manure as a N fertilizer and contain about the same amt. of K_2O and P_2O_5.

Bredon, G. and Dubois, A.
DETERMINATION OF OIL IN PEANUT OIL CAKE.
Chimie et industrie Special No., 437 (Sept.,1925); C. A. 20, 515 (1926).
The method proposed consists in detg. the I no. via Hubl, with Et_2O instead of $CHCl_3$ as solvent. A blank should be run on the extd. cake. The detn. can be run in about 2 hrs., it gives results agreeing to within a few tenths % with the ordinary extn. method, and is considered valuable for works control. It is applicable to other cakes, except those of the coprah group which have too low I nos.

Div. of Chemistry.

ANALYSES OF RHODESIAN FOODSTUFFS.

Rhodesia Agr. J. 31, 651-8 (1934); C.A. 29, 1887 (1935).

Analyses are given of 135 substances, a few of which follow:

Foodstuff	H_2O	Ash	Protein	Ether ext.	Fiber	Carbohydrates
Virginia bunch peanuts	8.15	2.73	27.94	43.57	2.56	15.05
White flowered flaxseed	6.97	3.84	22.75	30.23	5.67	30.54
Dent corn	7.0	1.3	9.4	4.5	1.9	75.9
Flint corn	7.4	1.8	10.9	5.3	1.9	72.7
Kinvarra oats	9.66	3.92	12.23	8.70	13.71	51.76
Panicum sp. seed	11.12	2.20	8.18	1.55	3.48	73.47
Pumpkin seed	5.54	3.93	33.91	39.57	15.05	2.00
Black Sel. sunflower seed	5.76	2.28	14.37	26.77	25.24	25.58
Coffee bran	11.9	4.3	2.0	0.2	60.3	21.3
Cottonseed meal	7.3	4.9	33.6	13.3	13.4	27.6

Foodstuff	H_2O	Ash	Protein	Ether ext.	Fiber	Carbohydrates
Locust meal	7.06	6.84	47.47	22.91	10.81	4.91
Mealie meal	10.22	1.30	8.58	4.69	1.96	72.61
Acacia benthami beans	6.96	3.45	12.56	4.57	9.46	63.00
Carob beans	8.14	3.44	16.38	2.55	7.93	61.56
Cowpeas	13.9	3.4	23.4	1.8	5.9	51.6
Nyomo beans	9.4	3.6	16.3	6.8	5.7	58.2
Ischaemum glaucostachyum hay	13.19	9.15	9.56	1.80	32.09	34.21
Phytolacca octandra hay	13.9	11.3	22.8	2.1	15.0	34.9
Edible canna tubers	84.4	0.60	0.77	0.04	0.63	13.56
Kigelia pinnata fruit	85.4	0.66	0.84	0.88	4.29	7.93
Majorda melon	94.62	0.36	0.44	0.03	0.43	4.12
Sunflower silage	11.40	10.79	14.06	5.26	14.48	44.01

Emmerling, Adolph

PALM CAKE AND PALM CAKE MEAL

Landw. Versuchs-Stat., 1898, 50, 5-63; B. A. 1898, ii, 448.

Acidity of palm cake.

A number of samples of cake and meal were analysed and the results grouped according to the odour of the samples, some having a "fruity" odour, others being slightly rancid. The following average percentage results are given for (1) cake, (2) meal, and (3) crushed cake. The acid number represents milligrams of KOH per gram of fat.

	Proteids.	Fat.	Oleic Acid	Acidity	Acid number
Palm cake.....	17.12	7.85	2.36	32.0	63.4
Palm meal.....	16.49	8.19	3.83	48.5	96.6
Crushed cake.....	16.84	1.67	0.45	28.9	57.5

The acidity results, which are somewhat higher than those previously obtained (Nordlinger, Abstr., 1890, 929; Heinrich, 2te, Ber. Landw. Versuchs-Stat. Rostock, 1894; H. Fresenius, Landw. Versuchs-Stat., 1891, 38, 296; and von Rümker, Versuchs-Stat. Preussens, i J., 1894) show that

on the whole the acidity of palm cake meal is higher than that of palm cake. The slightly rancid samples are somewhat more acid than the others, whilst the samples of a fruity odour are much more acid than those which did not have this odour. The acidity increases with decrease in amount of fat; the amount of acid remains (on the average) constant.

In the case of earth-nut cake, Reitmair (Abstr., 1891, 770) found the cakes richest in acid contained a low percentage of fat. This does not hold good in the case of palm cake, probably owing to the processes of manufacture of the two products being totally different (compare Emmerling, Landw. Versuchs-Stat., 1897, 49, 51).

With regard to the changes which take place when palm oil is kept, it was found that there was relatively little alteration in the amount of acid after two years. The volatile fatty acids increased slightly when the oil was exposed (4 months) to air. The iodine number diminishes when the oil is kept, and the change seems to be quickened under the influence of light. Exposure for 2 years considerably raised the acetyl number of palm oil. Palm cake kept for 2 years showed very little change in the amount of fat; there was a very slight gain in proteids not to be accounted for by loss of water.

Acidity increased very greatly when the cake was kept, whether exposed to light or in darkness, and in closed vessels. The iodine number of the cake increased after prolonged exposure.

Ezendam, Joh. A.

QUANTITATIVE BOTANICAL ANALYSIS OF FEEDING CAKES.

Verslag. Land. Onderzoek. Rijkslandbouwproefsta. 25, 1-62 (1921) Botan. Abstracts 12, 219-20; C. A. 17, 2757 (1923).

The most important methods are given, with statements as to their practicability. E. developed a method in which the principle was to find an element for measuring in those cases in which the amt. of a certain constituent could not be found from a comparison by counting or from a comparison by measuring or when no measurable elements or particles were present. A sample of the cake is ground until it passes a screen with circular holes 1 mm. in diam. A definite quantity (0.5-2 g.) is boiled with acids and alkali and washed with hot water on a muslin cloth. The remaining substnace is mixed with 10 cc. of a mixt. of glycerol and water (1:1). This is spread on a special glass plate and measurements are made with a Nebelthau or similar microscope. After 15 minutes particles are measured in at least 3 strips and at least 300 fragments. Measuring is the detn. of the no. of squares each particle covers. Then the sum total of the squares covered by all particles is divided by the no. of g. used, the total surface of the rows (each row is 1.2 square cm.), and by the normal no. The no. obtained gives the percentage of the impurity or particles present. The normal no. is the no. of squares covered by the fragments of impurities, or of a certain substance, present on 1 square cm. with 1 g. of a 1% mixt. of impurity or substance.

The normal no. must be detd. for each impurity or substance. The usefulness of this method depends mainly upon the exactness of the normal no. Investigations were made and normal numbers determined for the following impurities or admixts.: rice husks, barley husks, ground nut shells, coffee husks, cacao husks, soy bean, and impurities in linseed cake.

Gregoire, A., Hendrick, and Carpiaux, E.
CONCERNING SPOILED PEANUT CAKE
Bull. Inst. Chim. et. Bact. Gembloux, 1908, 44-65; C.A. 2 2108 (1908).

In all the spoiled peanut cakes examined, sugar was less than 6% of the total organic matter exclusive of fat, and acidity was greater than 60% measured as oleic acid.

Hiltner, L.
APPROXIMATE ESTIMATION OF ADULTERATION OF EARTH-NUT CAKE AND MEAL.
Landw. Versuchs-Stat., 40, 351-355; B. A. 1892, 1535.

The substance (about 0.2 gram) is placed on an inverted plate and completely moistened with tincture of iodine. After a few minutes, the meal is distributed over the whole surface by means of a jet of water from a wash-bottle. The liquid must still contain iodine, and is made clear by the addition of a few drops of alcohol. The water is now drawn off, and the substance air dried and placed on green paper. By means of a lens of low power, the particles of cake which are blackened by the iodine are readily separated from the poppy seeds; the separated portions are then weighed. In an experiment made with known quantities, 10.64 percent of poppy seed was found instead of 10 percent. In this case, the particles of the ground cake were rather large, and the separation therefore easy. When there are finely-powdered, dust-like particles, the separation is more difficult. After treatment with iodine and drying, the substance is sifted in a 0.25-mm. sieve and the separation in the coarse portion is made as usual. In two check experiments, the results were within 5 percent of the actual amount. The percentage of poppy seed in the portion passing through the sieve may be determined by separating under a microscope, but the amount is generally small, and may be judged without actual separation.

The method is quickly carried out, and is applicable not only in the case of adulteration with poppy seed, but in nearly every case, as the substances used for adulteration are nearly all free from starch.

Ingle, H.
NOTES FROM THE CHEMICAL LABORATORIES.
Transvaal Agr. J. 6, 426-8.; C.A. 2, 2106 (1908).

Ground nut cake, wild plums, pearl millet, and sunflower seed were analyzed with special reference to oil making in the case of the plums and sunflower seed. The plum pits, if dried, would contain, according to the author 38.1% oil.

Juillet, A. and Courp, J.
THE EXAMINATION OF OIL PRESS CAKES IN WOOD LIGHT.
Bull. sci. pharmacol. 38, 562-72 (1931); C.A. 26, 865 (1932).

The fluorescence of different industrial oil press cakes in Wood light at different A. U. has been studied. The following products including their most common adulterations were exand.: copra, cannabis, linseed, peanut, and sesame. The addn. of small quantities of adulterants was detected.

Martin, W. S.

ANNUAL REPORT OF THE AGRICULTURAL CHEMIST FOR THE YEAR 1933.
Uganda Protectorate, Ann. Rept. Dept. Agr. 1933, Pt. 2, 60-5 (1934);--
C.A. 29, 1915 (1935).

Soils.--Despite the high rainfall, Uganda soils contain exchangeable Ca (sol. in 0.5 N AcOH) in amts. up to 0.6% and exchangeable K_2O in amts. up to 0.07%; the values, in general, compare favorably with those of agricultural soils in temperate climates. The soils are low in available P and are comparatively high in total Ca. The sap of the muvule tree (Chlorophora excelsa) and the large stones that are often found in the heart wood of the trees are high in Ca; this tree grows on Ca-rich soils. Large areas of soils in Uganda have pH values of 6.0-6.5. Shea nuts.--The oil and H_2O contents, resp., of different grades of the nuts were (1) nuts of very good appearance 52.0, 6.6, (2) shriveled black nuts 51.3, 7.0 and (3) young white, well-filled nuts, retaining seed coat 55.3, 6.1%. The fat from the black nuts was semisolid at 20°, but that from the other samples did not solidify. Groundnut meal and simsim cake, produced in Uganda, contained H_2O 9.0, 9.2; ash 8.3, 9.4; fat 18.1, 16.4; fiber 8.5, 8.2; protein 37.3, 36.9; and carbohydrate 18.8, 19.9%, resp.

Mooser, W.

(NEW ALKALOID IN) EARTH-NUT.
Landw. Versuchs-Stat., 1904, 60, 321--346; B. A. 1905, i 79

Earth-nut meal contains, in addition to the bases choline and betaine, isolated by Schulze, an alkaloid arachine, $C_5H_{14}ON_2$. It was obtained as a yellowish-green syrup, rather readily soluble in water and alcohol, less so in chloroform, and insoluble in light petroleum or ether. The platinichloride,

$$(C_5H_{13}ON_2)_2,H_2PtCl_6,$$

is an orange-coloured, crystalline substance melting at 216°, soluble in cold water and insoluble in hot water. The aurichloride,

$$(C_5H_{13}ON_2),HAuCl_4,$$

forms lemon-coloured, strongly refractive crystals. Both double salts crystallise in a variety of forms.

Subcutaneous injection of arachine hydrochloride immediately produced somnolence with frogs and rabbits, and partial paralysis. In the case of frogs, cutting off the toes produced no movement. The effect of the poison passed off the next day.

A number of samples of earth-nut meal were examined, and all were found to contain the alkaloid.

Obarski, E.

CONTRIBUTIONS TO THE EXAMINATION OF PEANUT CAKE AND COTTONSEED MEAL.
Posen. Landw. Ztg. (Fühling), 58, 305-8; C.A. 3, 1783 (1909).

A method for detecting castor-bean pulp in peanut cake is thus described: Boil 10 g. of peanut meal in 5% NaOH and then in 5% H_2SO_4 for 15 min. and bring on a close filter. Wash thoroughly and the black particles of the shells of the castor beans, if present, may be seen with a hand lens or even with the naked eye. With cottonseed meal the method of determining roughly the proportion of hulls is based on the fact that when the meal is mixed with water the hulls can be distinguished by their color.

Rogozinski, F.

BIOCHEMISTRY OF PHOSPHORUS.

Bull. Acad. Sci. Cracovie (B) No. 5, 87-98 (1915); Zentr. Biochem. Biophys. 21, 495-6; C.A. 16, 3499 (1922).

Partition of the P_2O_5 in several plant products.--Study was made of several meals and press cakes which are by-products of the milling and oil industries. In by-products of the cereals, such as maize fodder, wheat bran, malt sprouts and rice fodder, the insol. P_2O_5 forms only 16 to 35% of the total P_2O_5. The residues from oil-bearing seeds (press cakes of cottonseed, peanut, and linseed) contain from 50 to 82% of their total P_2O_5 in the insol. form. The greater portion of the sol. P_2O_5 of the maize kernel, including all the phytin P_2O_5, is present in the germ. The mobilization of P_2O_5 in young seedlings is demonstrated on comparison of bruised barley and sprouted malt; the inorg. P_2O_5 increases in the latter at the expense of the P in the proteins and the phytin. The total, and especially the phytin, P_2O_5 decreases markedly with the fineness of the milled product. Phytin P_2O_5 is apparently stored in the outer portion of the wheat kernel. Rye bran, in comparison with wheat bran, is comparatively poor in phytin P_2O_5 but rich in inorg. P_2O_5. Wheat bran, rice fodder, and rape press cake are the only sources of phytic acid worthy of consideration in the prepn. of that compd. Coconut press cake has a high phytin and a low phosphate content, while conditions are reversed in palm nut press cake. Nature of the inorganic phosphate in the wheat kernel.--All the inorg. P_2O_5 is sol. in water, and is present as K phosphate. Apparently this is also true for other seeds.

Seshan, P. A.

THE UNSUITABILITY OF THE EXISTING METHODS FOR THE DETERMINATION OF FATS IN BIOLOGICAL MATERIAL.

Indian J. Vet. Sci. 5, 355-63 (1935); C.A. 30, 3008 (1936).

About 50% more ether-sol. material was obtained from ragi straw, about 30% from feces and about 2% from groundnut cake by extg. the samples for 60 hrs., as compared with the results obtained by extg. for 16 hrs. as recommended in the methods of analysis of the Assoc. Official Agr. Chem. The characteristics of the ext. obtained in the 1st 10 hrs. from ragi straw were acid value 4.1, sapon. value 13.2, fat acids 29.6% and unsaponifiable matter 65.0%; the ext. obtained in the next 34 hrs. showed acid value 8.1, sapon. value 119.2, fat acids 40.5 and unsaponifiable matter 30.5%. Results obtained by the alkali hydrolysis method indicated the formation of fat acids from carbohydrates during the hydrolysis; there was evidence of the presence, in the acids formed, of groups with lower mol. wts. and unsatd. linkages.

Shiba, Tokitaka and Koyama, Manshi

NUTRITIVE VALUE OF SOY-BEAN AND PEANUT PROTEINS.

J. Chem. Soc. Japan 44, 58-68 (1923); C.A. 17, 2732 (1923).

Peanuts obtained on the market (analyses given) were dried at 70-80°, ground and the fat was removed by alc.-Et_2O. After pulverization, they were again extd. with Et_2O so that the fat content is less than 1%. The sample thus prepd. contained on the basis of air-dried material 13.30% H_2O, 8.90% total N, 0.14% fat, 4.00% crude fiber, 3.64% crude ash, 55.62% crude protein and 23.4% sol. non-nitrogenous substance. This was fed to albino rats,

28 parts of protein-free milk, 14 parts of butter, 14 parts of protein (the samples), and 44 parts of starch and cellulose being given. Rat A (96 g.) increased in wt. to 326 g. in 150 days, and rat B (84 g.) to 311 g. Further chem. analyses of peanut protein showed that globulin, sol. in 10% NaCl, (arachin and conarachin) constitutes the main portion of the albumin, which contains 25.29% arginine N, 4.15% lysine N, 5.04 histidine N and 0.90% cystine N of the total N. The distribution of PO_4 in the samples was: total 2.12%, inorg. 0.23%, org. 1.89%, alc.-Et_2O-sol. 0.03% and nucleic acidlike PO_4 0.3%. Soy beans were freed from fat (less than 1%), and the diets contg. 14% soy-bean protein were used for feeding expts. The soy-bean meal thus prepd. contained 9.97% H_2O, 40% crude protein, 0.8 crude fat, 7% crude fiber, 4.1% ash, and 29.4% non-nitrogenous substances. Growth with soy-bean protein was not quite as good as with peanut protein.

Timson, S. D.

THE GROUND NUT.

Rhodesia Agr. J. 27, 15-38 (1930); C. A. 25, 153 (1931)

Analyses of peanut seeds, shells, vines, and oil cake are tabulated.

Warth, F. J.

REPORT OF THE PHYSIOLOGICAL CHEMIST.

Sci. Repts. Imperial Inst., Agr. Research Pusa 1933-34, 125-38 (1936); C. A. 31, 1512 (1937) cf. C. A. 29, 1465.

Digestibility trials with coarse fodders and lucerne.-The percentages of protein in Aurangabad hay, spear grass and Rhodes grass were considerably higher in the early cuts than in the late cuts, whereas the percentages of carbohydrates were slightly higher in the late cuts. The digestions coeffs. for protein and carbohydrates decreased as the protein content of the fodder decreased. There was practically no change in the chem. compn. and only a very slight decrease in the digestibility of lucerne hay as compared with the corresponding fresh lucerne. Minerals in pasture grasses.-Data are given on the percentages of ash, P, Ca, Mg, Na, K and crude protein in Andropogon contortus, Cynodon dactylon and Pennisetum cenchroides cut at the beforeblooming, full-bloom and dead-ripe stages, resp., for 2 successive years. Extn. of fats from foods and feces.-The material extd. by petr. ether in 16 hrs. from ragi, straw, feces and peanut meal amounted to 68, 80 and 98%, resp., of that extd. in 108 hrs. Utilization of S by sheep. - Assimilation of inorg. S was greatly increased by feeding a sulfate supplement. Ingestion of Na_2SO_4 caused a marked increase in the amt. of org. S excreted in the urine. Physiol. studies. - In expts. with bullocks the highest alky. and the greatest vol. of urine were obtained when the animals were fed on early-cut fodder. With later cuts the vol. and alky. both decreased and with some overripe fodders decidedly acid urines were obtained. The blood Ca tended to increase with the maturity of the fodder but there appeared to be no corresponding regularity in the blood P. A consistent increase in blood P occurred at the time (April) when the P content of the natural herbage was at its lowest level.

COMPOSITION OF FODDER

(Landw. Versuchs.-Stat., 26, 318-321.); B. A. 1881, 636

A commission on the motion of J. König has been appointed to consider the relative values of different kinds of fodder.

The following table of analyses has been formed by the Commissioners:--

	No. of Anal.	Average composition					
		Water	Protein	Fat	N-free ext.	Cellulose	Ash
Maize.....	46	14.21	9.86	4.54	66.85	2.91	1.63
Field beans.....	18	15.93	25.06	1.55	46.88	7.36	3.21
Lupines.....	12	13.50	35.56	5.15	27.23	14.56	4.00
Wheat bran (fine)....	21	12.07	14.05	4.17	58.34	7.30	4.07
" " (coarse).	89	13.57	13.56	3.37	54.98	8.85	5.65
Rice flour (fine)....	18	11.54	9.88	7.28	63.28	2.71	5.31
" " (coarse)..	71	10.47	10.85	9.94	47.01	11.86	9.87
Rye bran.....	102	12.23	14.53	3.17	59.53	5.95	4.56
Rapeseed cake.....	133	11.24	31.11	9.89	29.18	11.19	7.39
Linseed cake.....	83	12.47	28.89	10.33	30.33	9.79	8.19
Poppyseed cake.....	11	11.54	32.74	7.84	23.46	12.15	11.27
Earthnut cake.....	35	11.15	46.12	6.64	25.82	5.64	4.63
Palmkernel cake.....	107	10.37	16.28	10.45	37.71	21.36	3.93
Palmkernel flour.....	45	10.92	17.13	3.70	41.34	22.99	3.92
Cocoanut cake.....	26	9.33	20.03	11.39	39.79	13.90	5.56
Sesame cake.....	27	12.14	36.77	12.00	20.31	8.47	10.31
Flesh-fodder flour...	19	10.60	72.66	12.27	0.72	--	3.75

Anacker

POISONING OF CATTLE BY EARTH-NUT CAKE.
Died. Centr., 1883, 210; B. A. 1883, 818.

Examination showed that the death of the cattle arose from the presence in the cake of mildew, sand, small stones, croton and castor oils.

Anderson, Prof. Thomas

AGRICULTURAL CHEMISTRY: (I) CONCERNING SODIUM CHLORIDE, (2) THE COMPOSITION OF CHICORY LEAVES, (3) PEANUT OIL CAKES.
Journ. of Agricult. and transact. of the Highl. and agric. Soc. of Scotl. Nr. 43, New Ser. p. 552-557; C 1885, 325.
(Abstract translated from the German by J. R. Loeb and H. J. Morris)

1.----------

2.----------

3. Concerning the oil cake of the peanut, Arachis hypogaea. The peanut is grown by the French in Algiers far and wide, from there was introduced to France. Also in Spain and on the Cape of Good Hope it is said to be cultivated already. The well known oil is pressed from the fruit. The author obtained from Maxwell and Company in Bordeaux samples of the oil cake, which was separated by means of the press, and has investigated them for their nutritive value as cattle feed. The analyses gave:

	Water	11.56
	Oil	12.75
	Albuminous substance	26.71
	Ash	3.29
	Fibre, etc.	45.69
		100.00
	Nitrogen	4.27
In the ash	(Phosphates	1.17
	(Phosphoric acid	0.08

These oil cakes are not very different from ordinary linseed oil cakes, which contain up to 4.8% nitrogen. However, accordingly as more or less oil is pressed from it, the constituents vary a little. Thus according to Leith a second imported brand gave:

	Water	10.01
	Oil	6.78
	Albuminous substance	33.70
	Ash	3.78
	Fibre, etc.	45.58
		100.00
	Nitrogen	5.39
In the ash	(Phosphates	1.14
	(Phosphoric acid	0.52

The price of the peanut oil cake in Bordeaux is 4 pounds 12 shillings 6 pence per ton.

Ayyangar, N. S., Rasul, Choudhury Karm, Singh, S. Kartar, Kolhe, D. B. and Sikka, Lalchand.

THE EFFECT OF SOME OIL CAKES ON MILK SECRETION.

J. Central Bur. Animal Husbandry and Dairying India 3, 77-91(1929); C. A. 25, 152(1931).

In the first expt., linseed cake, country coconut cake and expeller coconut cake were compared. Linseed cake appeared to produce a slightly larger vol. of milk than either coconut cake, but the increase in vol. was due only to diln., the milk from cows fed on coconut cake being distinctly richer in fat. There was no pronounced difference in milk from cows fed on the 2 varieties of coconut cake. In the second expt., linseed cake, peanut cake and cottonseed cake were compared. Peanut cake and cottonseed cake produced equal amts. of milk, both being slightly superior to linseed cake. Cottonseed cake was slightly superior to the other cakes in fat production, and produced milk contg. consistently higher percentages of N. H. Gill Ajeet Singh, Singh, Allam Naidu A. Gopalakrishnayya & Kelapanda Ayanna. Ibid 4, 7-22(1930). -Results previously obtained were confirmed.

Balland.

FEED SUBSTITUTES.

Compt. rend. acad. agr. France 4, 969-71(1918); C. A. 13, 351(1919).

Analyses are reported of distillery malt (1 sample), beet flour (1), cacao bran (1), peanut meal cake (6), and carambola meal cake (2). The av. analysis of carob pods is also given. These contain 30 to 40% sugar and almost as much starch. Carobs are food for both man and beast.

Brioux, Ch.

GROUND PEANUT SHELLS OR PEANUT BRAN?

Ann. fals., 6, 25; C. A. 7, 1244(1913).

The sale of ground peanut shells as cattle food under the misleading name of peanut bran is noted. Analyses of both products are given, showing that the former has very much less food value than the latter.

Brioux, Ch. and Guerbet, Maurice.

INTOXICATIONS INDUCED BY PEANUT-OIL CAKE CONTAINING SMALL QUANTITIES OF RICIN.

Compt. rend. acad. agr. France 6, 449-54; C. A. 14, 2225(1920); cf. C. A. 14, 3484(1920).

One-half kg. of peanut-oil cake per day fed to cattle in some cases produced abortions, due to a small quantity of ricin in the cake. Microscopical examn. showed that the cake contained 1.5-2% of ricin. Ricin is an agglutinin of the 1st order. In order to detect ricin, macerate (at 30-40°) a small amt. of the cake with 5 times its wt. of salt water (9 parts per 1000), adding xylene to prevent fermentation. After 15 hrs. filter and collect a portion of the filtrate corresponding to at least 10 g. of cake. Heat an hr. at 70° in a water bath to destroy certain non-resistant agglutinins in the peanut cake. Filter again to sep. the coagulated albumin and to the liquid obtained add 50% of its wt. of pure $(NH_4)_2SO_4$ crystals. Collect the ppt. on a small filter, drain well and wash with a few drops of water to remove the greater part of the $(NH_4)_2SO_4$. Remove the ppt. by means of a spatula and wash into a beaker with 5cc. of physiol. salt soln. Stir and filter. The filtrate obtained contains the ricin 10 times purer than that of the first maceration. Prep. after defibrination some red corpuscles of the rabbit, wash with salt water, centrifuge, then dil. with 4 times their vol. of physiol. salt soln. Introduce the ricin filtrate into a test-tube with a few drops of the above suspension of blood corpuscles, mix, place in oven at 37° favorable for agglutination. 2% of ricin in peanut cake gives an agglutination in 5-10 min., and is complete in 1 hr. The method is capable of detecting 0.2% of ricin cake.

Brioux, Ch. and Guerbet, Maurice.
INTOXICATIONS INDUCED BY PEANUT-OIL CAKE CONTAINING SMALL AMOUNTS OF CASTOR BEAN.
Compt. rend. acad. agr. France, 6, 449-54 (1920); C. A. 14, 3484 (1920).
In the abstract in C. A. 14, 2225 the French word "ricin" has been incorrectly translated "ricin" instead of "castor bean." It is explained that apparently some castor beans got mixed in with peanuts owing to the breaking of bags in shipping.

Crowther, C.
COMPOSITION, NUTRITIVE, AND MANURIAL VALUES OF VARIOUS FARM FOODS.
Univ. Leeds and Yorkshire Council Agr. Ed.(Pamphlet)73, 8 pl. folio(1916); Exp. Sts. Record 35, 66; C. A. 10, 2775(1916).

The compn. and nutritive value of the following feedingstuffs are given: Egyptian and Bombay cottonseed cakes; linseed, hemp-seed, rape, peanut, cocoanut, palm-kernel, and soy-bean cakes; soy beans; flaxseed; dried yeast; locust beans; wheat middlings, sharps, and bran; oatmeal; maize-germ meal; gluten meal; gluten feed; rice meal; malt; malt dust; wet brewers' grains; dried brewers' grains; dried distillers' grains; molasses; meat meal; fish meal; wheat; barley; oats; rye; maize; beans; peas; wheat, barley, rye, oat, bean, and pea straws; meadow hay; "seeds" hay; pasture grass; clover; vetches; alfalfa; cabbage; rape; turnip tops; turnips; swedes; mangels; carrots; sugar beets; potatoes; whole, skim, and sepd. cow's milk; whole, skim, and sepd. ewe's milk; whole, skim, and sepd. mare's milk; and whey.

Emmerling, A.
PRESENCE OF MILDEW, &c., IN CATTLE-FOODS.
Bied. Centr., 1884, 472-475; B. A. 1884, 1411.
Various forms of fungoid growths have been found in earth-nut and other cakes, and may be obtained by treating the powdered cake with a little water for 24 hours at 35°. The principal forms of schizomycetes observed were micrococcus, bacteria, and bacilli; at times leptothrix and cladothrix were observed, and in a few cases sarcina and spirilla. Of the 52 samples, 61 percent contained some of these growths; of cotton-cake and meal, 40 percent were infected, many containing a very high percentage of bacteria and bacilli, and it is to the presence of so many in this kind of food that the ills which often follow its use may be ascribed. Short accounts about several other cakes (linseed, &c.) are given.

Ewing, P. V., Ridgeway, J. W. and Doubt, W. L.
DAIRY CATTLE FEEDING EXPERIMENTS.
Texas Expt. Sta., Bull. 238, 1-14(1919); C. A. 13, 2550 (1919).
The expts. were conducted in 2 series. The first was to compare the relative value of peanut feed and cottonseed meal for milk and fat production; palatability, and general suitability of the feed for dairy cows was also taken into account. The second one was conducted to study the methods of prepn. of velvet beans and the effect upon milk and fat production.

Ezendam, J. A.
DETERMINATION OF THE CONSTITUENTS OF COTTONSEED AND PEANUTS AND THEIR DETERMINATION IN FEEDINGSTUFFS.
Verslag Landbouw Onderzoek. Rijksland-bouwproefstat 17, 89-96(1915); C. A. 11,2003 (1917).
Cottonseed: A discussion of cottonseed meal. The % of hulls in meal obtained by grinding the whole seed and also be separating the hulls as

nearly as practicable before the grindings is given. Microscopic examn. can det. only the presence and not the % of cottonseed meal in a feedingstuff. The amt. of hull fragments in a feedingstuff is not significant of the % of cottonseed meal present. While the structure of cottonseed is characteristic, this is lost in the meal due to the fact that the kernel is pulverized. A second characteristic is the presence in the seed of very fine dark filaments, visible in cross sections even to the naked eye. These lines become reddish brown when treated with ZnCl I, and dissolve in concn. H_2SO_4, giving a blood red soln. The above cannot be applied to meal because it is too finely pulverized a state. A combined chemical and microscopical method is as follows: A weighed quantity (50 mg.) of finely powdered feedingstuff is mixed with a few drops of a soln. of chloral hydrate. The particles of cottonseed now become a bright green. This mixt. is placed on an object glass and the green particles counted. From the ratio of the latter and of particles not colored green by chloral hydrate, the amt. of cottonseed meal can be estd. Less than 1% can be found in this manner.

Peanuts: A discussion of the constituents of peanut meal. A method for detection of its presence when mixed with linseed meal and other material used in the prepn. of feedingstuffs consists in looking for fragments of the membrane covering the kernel itself. This is not significant of the % of peanut meal present.

Freytag, C. and Becke

FEEDING HORSES WITH EARTH-NUT MEAL.

Bied. Centr., 1883, 284; B. A. 1884, 100.

Earth-nut meal may well replace two-thirds of the oats generally given to horses.

Hefter, G.

POISONOUS PEANUT CAKES

Siefensieder Ztg., 35, 1276-8; through Chem. Zentr., 1909, I, 597; C. A. 4, 2014 (1910).

It is the belief of the author that the poisonous cakes encountered by different manufacturers were contaminated by material from castor oil residues, the same presses being used for both materials.

Heim, F.

EMPLOYMENT OF GROUND NUT CAKE IN FEEDING OF LIVESTOCK.

Bull.de l' Office Colonial 10, 44-52; Bull. Agr. Intelligence 8, 763-5; C.A. 12, 961 (1918).

Ground-nut cake is a source of a high quantity of easily assimilable proteins, and is adapted to nearly all classes of animals.

Holdaway, C. W., Ellett, W. B., and Harris, W. G.

COMPARATIVE VALUE OF PEANUT MEAL, COTTONSEED MEAL AND SOY-BEAN MEAL AS SOURCES OF PROTEIN FOR MILK PRODUCTION.

Virginia Agr. Expt. Sta. Tech. Bull. 28, 5-54(1924); C. A. 20, 2373 (1926).

A study was made of the comparative utilization by dairy cows of the protein from peanut, cottonseed, and soy-bean meals. Two methods were used. The first was a detn. of the relation between the total crude protein of the meal and the digestible crude protein, to the milk protein produced. The second method compared the true resorbed protein from the meal with the sum

of the milk protein, maintenance protein, metabolic feces protein, and the body gains or losses. The rations used consisted of corn silage, corn meal, and starch in addition to the peanut, cottonseed or soy-bean meal under investigation. A comparison of the 3 concentrates by the first method showed that it required 3.33 lbs. of total crude peanut meal to produce 1 lb. of milk protein, while with both cottonseed and soy-bean meals 3.59 lbs. were required. The relative gross efficiencies in producing milk protein from total crude protein were: peanut meal 29.6%, cottonseed meal 27.8%, and soy-bean meal 27.9%. From the standpoint of digestible crude protein the efficiencies were: peanut meal 50%, cottonseed meal 46%, soy-bean meal 45%. The results by the second method reversed the order of efficiency for cottonseed and soy-bean meal but still placed peanut meal first in order.

Koldofleiss

EARTH-NUT CAKE.

Biod. Centr., 1883, 526-528; B. A. 1884, 356.

This cattle food having given unsatisfactory results of late, although numerous analyses show 40 to 50 percent protein and several percent albumin, with other food constituents normal, it was microscopically examined, and in many cases was found to contain quantities of fungus spores. 48 to 60 hours after moistening with very little water, the meal becomes covered with a yellow coating of an Aspergillus, similar to Aspergillus flavus. This fungus is of special interest, as in Japan it induces the fermentation and formation of sugar in rice. In the presence of more moisture, a black Aspergillus appears in colonies, also a thick covering of mucor-like fungi. These fungi cause changes in the meal, primarily a disappearance of albumin. Enormous quantities of bacteria were observed in many samples.

Kirchner, W. J., and Du Roi, P.

INFLUENCE OF GROUND NUTS ON THE PRODUCTION OF MILK.

Biod. Centr., 1879, 903-906; B. A. 1880, 487

Ground nut cakes, containing 52 percent of protein, gave favourable results as regards the production of milk, but seemed to have no special effect on the quantity of fat produced.

Knierim, W.

VALUE OF COMMERCIAL FOODS.

Biod. Centr., 18, 815-820; B. A. 1890, 395.

The object of the experiments first described was to determine the relative values of several kinds of cake with regard to the production of milk. The cow received 15 kilos. of clover-hay and 1.5 kilo. of cake. Rape-cake produced an increased amount of milk on the first day; the same was observed with cocoanut-cake. The increase was, in both cases, considerable, and the effect of the cocoanut-cake was more lasting than that of the rape cake. In other experiments, in which 10 kilos. of green fodder was given, linseed-cake (1.5 kilo.) gave an increase of 12 percent, and cocoanut-cake raised the yield of milk by 11 percent; hemp-cake had no effect at all. Sunflower-cake, poppyseed-cake, and cocoanut-cake (1.5 kilo. in each case) were given, together with meadow hay of bad quality (14 kilos.); in each case the yield of milk was considerably increased--the greatest increase being produced by the cocoanut-, and the least by the sunflower-cake.

Further experiments are described, in which oat-meal, sunflower-cake, cocoanut-cake, and pea-meal (1.5 kilo.) were given, along with a still poorer food, consisting of hay (9 kilos.) and oat-straw (3.5 kilos.). Cocoanut-cake and sunflower-cake gave equally good results; pea-meal was less effective.

In order to determine whether the failure of hemp-cake was due to its being less digestible, experiments were made with bullocks, horses, sheep, and rabbits. The effect on bullocks was comparatively slight. The horses were found to be capable of doing much less work when much hemp-cake was given to them, whilst with sheep the cake was found to be distinctly injurious, causing the animals to become thinner. Rabbits could not be kept alive on hemp-cake alone. It is possible that the cake might give better results when used with less nitrogenous fodder.

Sesame-cake was also found to be a very good milk producer.

Experiments with rabbits showed that cotton-seed-cake and earth-nut-cake are very digestible.

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Kruger, E.

THE POISONOUS EFFECTS OF PEANUT OIL CAKE.

Chem.-Ztg., 30, 999; C. A. 1, 454 (1907).

A case of poisoning cattle with fatal results from feeding peanut oil-cake is reported. Some experiments were conducted later to confirm the poisonous effects of the oil cake, but without conclusive results.

Landis, J.

THE COMPARATIVE VALUE AS A PIG FEED OF FISH MEAL AND OTHER FOODS RICH IN ALBUMIN.

Ann. Agr. Suisse 1923, Part V; Intern. Rev. Sci. Practice Agr. 2, 434-5; C. A. 19, 1462 (1925).

Expts. were made with skimmed and centrifuged milk, meal, and sesame cake, linseed and groundnut. The results of 28 analyses of fish meal recently carried out in Switzerland proved that the samples contained on an av. 52% crude protein, 1.7% fat, 25.6% phosphate of lime, and 3.3% salt. These averages hold for the 2 brands of fish meal used in these expts. The skim milk produced a greater increase in live-weight than the fish meal. On an av., the lots receiving cake gained practically the same amt. of live-weight daily as those given fish-meal. Further expts. are in progress.

McCandlish, A. C. and Weaver, E.

COCONUT MEAL, GLUTEN FEED, PEANUT MEAL, AND SOY BEAN MEAL AS PROTEIN SUPPLEMENTS FOR DAIRY COWS.

J. Dairy Sci. 5, 27-33 (1922); C. A. 16, 3113 (1922).

Old process linseed oil meal, peanut meal, soybean meal, and gluten were used as protein supplements in the diets of dairy cows. Little difference in value was observed with the possible exception of coconut meal which may have a higher value than the other feeds studied, despite its lower content of total protein. In palatability the feeds ranked as follows: linseed oil meal, soybean meal, gluten feed, peanut meal, and coconut meal.

Meyer, F.
EARTH-NUT CAKE-MEAL COMPARED WITH RYE-MEAL AS FOOD FOR MILCH COWS.
Bied. Centr., 1885, 537-538; B. A. 1885, 1252

Earth-nut cake-meal is an advantageous food for milch cows, increasing the yield of milk; whereas the opposite occurs when rye-meal is given.

Peage, H.
FODDER EXPERIMENTS ON MILCH COWS WITH COTTON-SEED MEAL AND PEANUT MEAL.
Bied. Centr., 1881, 612-615; B.A. 1882, 321.

One of the faults of peanut cake is that the quality varies within wide limits, owing to the liability of the nuts to become rancid during their long transit by sea. Cotton-seed cake on the contrary keeps very well.

The animals on which the experiments were made as to the value of the respective cakes were two lots of 10 cows each, chosen with great care, so that both should be equally suitable; the first lot was fed on peanut cake for a period of 15 days, and then on cotton-seed meal for the same length of time; the second lot commenced with the cotton-seed and finished with the peanut cake.

The analyses of both foods are given:

	Cotton-seed meal	Peanut cake
Moisture	8.50	9.80
Protein matter	41.50	48.25
Fat	16.67	8.57
Cellulose	7.78	5.26
Non-nitrogeneous extract	18.39	23.69
Ash	7.16	4.43

1 kilo. of each was given along with the usual fodder of the animals, the cottonseed meal was much relished.

From a tabular statement of the average milkings, it appears that the substitution of cotton-seed meal for the peanut cake was followed by an increase in the yield of milk, but on the second lot of cows the alteration did not occasion any increase. Samples of butter were made five times during each period; during the feeding on peanut cake, it required 34.21 litres to produce 1 kilo. of butter; during the cottonseed period, it required but 31.18 litres to the kilo of butter; the flavour of both was equally good. The results of the experiments were favourable to the peanut cake, but not sufficiently so as to cause the author to recommend its substitution for cotton-seed meal.

Ramm, Eberhard, Momsen, C., and Schumacher, Th.
FEEDING EXPERIMENTS ON COWS WITH PALM KERNEL CAKE, CRUSHED PALM KERNELS, AND LINSEED, RICINUS, AND EARTH NUT MEALS.
Bied. Centr., 1901, 30, 321-322; from Milch-Zeit., 1900, Nos. 19, 20, 22, and 23; B. A. 1901, ii 469

Linseed meal gave the highest yield of milk fat; the butter fat had the highest iodine number, which accords with the observation frequently made that linseed meal produces soft butter.

With palm kernel cake, less milk was produced, but nearly as much butter fat, the percentage of fat in the milk being much the highest; the butter was hard, the butter fat not containing much olein. Palm kernels (crushed) were not quite equal to the cake, but form a convenient food.

Earth nut meal is not recommended. Ricinus meal gave the worst results, but it is not injurious.

Ranke, H.
A FEEDING EXPERIMENT WITH BULKY BEETS AND THOSE RICH IN NUTRIENTS.
Deut. landw. Tierzucht 42, 533-5 (1938); C. A. 33, 1831 (1939).
Analyses are given of beets, hay, lucerne, straw, peanut meal and bran.

Schmidt, Franz
THE PRESENCE OF RICIN IN PEANUT CAKE RESIDUE AND THE APPARENT TOXICITY OF PEANUT CAKE MEAL CONTAINING RICIN.
Hamburg. Z. öffentl. Chem. 13, 246-55 (July 15); C.A. 2, 3248 (1908).
Presented at the Fertilizer and Cattle Food Dealers' Meeting, Eisenach, June 30, 1908. No experiments are recorded. The writer claims that no cases of poisoning among animals due to the presence of ricin or jatropha in peanut cake are recorded and he pleads for the allowance of a trace of these two toxic substances in this product.

Schrodt, M.
FEEDING WITH EARTH-NUT AND PALM CAKE.
Bied. Centr., 1887, 624-626; B. J. 1888, 174
The animals employed were cows, and they were fed with palm-nut cake containing 15 percent albuminoids, whilst in the other periods of feeding they received earth-nut cake, which contained three times that quantity.
Earth-nut cake cannot be replaced by a similar quantity of palm cake without a loss of milk, fat, and dry matter; and cotton cake produces the best results of all known cakes.

Smetham, A.
SOME NEW FEEDING STUFFS AND THEIR RELATIVE VALUES AS CATTLE FOODS.
Roy. Lancashire Agr. Soc. J., 1909, 28-45; C.A. 4 1329 (1910).
Analyses are reported of Java beans, Indian dari, Guinea corn meal, lentils, locust beans, coconut cake, copra cake, palm kernel meal, candle nut cake, Para rubber nuts, tallow nuts, canary-seed cake, poppy-seed cake, peat dust, hemp-seed cake, Burm ground nut cake, soy-bean cake, Japanese linseed cake, cottonseed cake, and other feeding stuffs from different countries.

Sornay, P. de
LIVESTOCK FEEDING.
Rev. agr. Maurice 5, 170-1(1928); C. A. 23, 452 (1929).
The feeding value, calcd. according to Kellner's formula, is 75.7 for peanut cake, 76.5 for copra cake, and 68.6 for acacia seed; the protein-carbohydrate ratios are resp., 1:1.5, 1:5.5, and 1:1.6. These ratios are too narrow, and the products must be supplemented by carbohydrate feeds. Acacia seed has a very hard, indigestible outer layer which amounts to 46% of the total wt. This fact must be considered in comparing its price with that of similar products.

Warth, F. J.
REPORT OF THE PHYSIOLOGICAL CHEMIST.
Agr. Research Inst. Pusa, Sci. Repts. 1928-29, 130-40(1930); C. A. 24, 4096 (1930).
The P_2O_5 and K_2O contents of late cuts of pasture grass were only 25-40% of that of early cuts of grass from the same plots, but there was no significant change in the CaO content. Silage.-In 10 expts. on the prepn. of juar silage an av. of 5.8% of the dry matter and 11.8% of the

crude protein was lost during the ensiling process. A satisfactory silage, which was readily eaten by cattle, and gave favorable digestion results, was prepd. from wheat straw. Hippuric acid excretion.-The acid-base balance of the animal system is directly influenced by hippuric acid excretion, the reaction of the urine being dependent in great measure upon this substance. The quantities of hippuric acid eliminated were found to be serious in several cases, indicating the presence of considerable potential benzoic acid in certain fodders. The potential benzoic acid content of ripe juar, ragi straw, meerut hay, and peanut cake was 1.20, 0.97, 1.01, and 2.07% resp. Acid-base balance of the urine of cattle.-Ranges of Ph from 5.6 to 8.5 were observed in the urine of cattle fed with different fodders, each fodder being characterized by urine of fairly definite Ph. Ripe juar gave urines varying in Ph from 5.70 to 6.15 while young juar and Rhodes grass gave urines varying in Ph from 7.9 to 8.5. The acid urines all contained NH_3, while the alk. urines were NH_3-free. The acid urines contained only traces of CO_2 while the alk. urines contained comparatively large quantities. Hippuric acid was the principal org. acid present.

Wilk, Leopold.

THE ACIDITY OF IMPORTANT COMMERCIAL FEEDS.

Z. Landw. VersuchswOster 21, 202-43(1918); Biedermanns Zentr. 49, 267-9 (1920); C. A. 14, 3114 (1920).

Samples of pumpkin cake, sunflower cake, rape cake, flax cake, corn residue, peanut cake, molasses, sesame cake, and rice meal were examd. The table of results shows that 1/5-1/10 of all samples have been richer in acid than normal feeds, while 7-43% were very rich in acids.

Wolde, W.

RICE AND EARTH-NUT MEAL AS FOOD FOR MILCH COWS.

Bied. Centr., 1883, 170; B.A. 1883 820.

Rice meal is here shown to be less costly, more productive of milk, and more palatable than earth-nut meal.

PEANUT CAKE

Nutrition

Boigey, Maurice
THE NUTRITIVE VALUE OF PEANUT MEAL.
Bull. acad. med. (3), 101, 284-6 (1929), C. A. 23, 2766 (1929).
Peanut meal has the following compn.: H_2O 9.40, protein 58.20, fat 6.09, glucose 5.05, other carbohydrates 17.25, cellulose 0.49, ash 3.52. Comparative tables show that the digestibility is equal to that of meat. B. recommends that it be mixed with with other flours.

French, M. H.
ANIMAL NUTRITION RESEARCH.
Tanganyika Territory Dept. Vet. Sci., Ann. Rept. 1931, 32-46 (1932); C. A. 28, 838 (1934)
Compn. of grasses near Amani -. Detailed analyses are given of Amphilophis insculpta Stapf., Cymbopogon giganteus Stapf., Digitaria minutiflora Stapf., Panicum trichocladum Hack., Melinis minutiflora Beauv., Panicum maximum Jacq., Brachiaria mutica Stapf., Cynodon dactyorn Pers., Sorghum verticilliflorum Stapf., Pennisetum purpureum Schum., Paspalum dilatatum Pers., Paspalum conjugatum Berg., Paspalum scrobiculatum Stapf., Chloris gayana Kunth., Desmodium adscendens and Ipomoea batatas, cut at different stages of growth and maturity. In general, the grasses are very deficient in N and sol. ash constituents and the mineral elements, particularyl P and K, are below the normal values for natural English pastures. Feeding stuffs. - Analyses are given of peanut, simsim and coconut cakes, oats, beans, linseed, red mtama bran and dried mtama grains produced in Tanganyika. Dried mtama grain is characterized by a very high SiO_2 content (29.75%). A sample of coffee berry pulp contained a considerable amt. of caffeine. The results of digestibility expts. with Tanganyika hays are given. Ibid. 1932, 29-71 (1933). - Compn. and digestibility of feeding stuffs available in Tanganyika Territory. Extensive data are given on "Kanarago" beans (Phaseolus vulgaris), "Kundi" cowpeas (Vigna sinensis), peanut cake, blue-lupine seed, lucerne hay, cotton seed, dried locusts, peanut tops, leaves of Disperma trachphyllum, pods of Acacia spirocarpa and A. Albida, corn and millet brans, corn silages, cassava roots, grass silages and hays.

French, M. H.

ANIMAL NUTRITION RESEARCH.
Ann. Rept. Dept. Vet. Sci. Tanganyika Territory, 1933, 49-75(1934); C. A. 28, 5941 (1935); cf. C. A. 26, 63[illegible].

Nutritive value of oil cakes and cottonseed.- Groundnut cake, sesame cake, coconut cake and cottonseed, produced in Tanganyika Territory, contained crude protein 46.24, 43.16, 21.72, 22.47; true protein 44.50, 40.30, 19.63, 20.34; amides 1.74, 2.86, 2.09, 2.13; Et_2O ext. 4.71, 11.63, 14.98, 18.75; N-free ext. 36.75, 27.10, 39.23, 26.01; crude fiber 5.64, 5.48, 15.21, 27.80; total ash 6.66, 11.63, 8.89, 4.97; SiO_2 2.24, 2.67, 3.23, 0.56; CaO 0.466, 1.54, 0.499, 0.32; and P_2O_5 1.50, 1.51, 1.53, 1.85% resp., on the dry basis. Data are given on the digestibility by sheep of the dry matter, org. matter, crude protein, Et_2O ext., N-free ext., crude fiber and ash, and on the starch equivs. and the nutritive ratios. The value of guinea grass (Panicum maximum) as silage. A sour silage prepd. from the grass cut at the flowering stage was readily eaten by sheep and oxen; it contained (dry-matter basis) crude protein 6.34, Et_2O ext. 2.67, N-free ext. 31.67, crude fiber 39.69, total ash 19.63, SiO_2 12.23 and SiO_2-free ash 7.40%. The silage was intermediate in feeding value between chaffed corn silage and local grass silage consisting principally of Cynodon plectostachyum. Compn. of leaves of Disperma trachyphyllum.- The young leaves, 5 weeks and 7 weeks old, and the dead leaves contained crude protein 22.34, 13.04, 8.36; true protein 19.66, 12.04, 6.14; Et_2O ext. 2.56, 2.72, 2.41; N-free ext. 43.15, 52.57, 47.25; crude fiber 12.81, 13.41, 16.17; total ash 18.54, 18.26, 25.81; SiO_2 0.62, 1.13, 20.24%, resp., on the dry-matter basis. Data are given on the compn. of star grass (cynodon plectostachyum) under different systems of cutting; The samples, which were all taken from grass grown on fertile soil, were rich in CaO, P_2O_5 and Na_2O, and compared with East Africa pastures in general, they were well supplied with K_2O. A survey of the P content of the blood of native cattle in widely scattered districts showed no pronounced deficiencies in this element. Blood changes during parturition. --Expts. were carried out on 2 half-grade Ayrshire cows. The protein fractions varied considerably during the periods just before and just after calving. There was no general change in the level of the protein fractions with the possible exception of the fibrinogen, which appear to rise quickly after parturition, and the albumin, which appeared to drop. The inorg. P showed a definite decrease about the time of calving, while the org. P showed a slight increase. The Ca content fell markedly at the time of calving. The blood sugar showed a rise slightly before calving, reaching a max. about the actual time that calving occurred. The pH, nonprotein N and Cl were not affected by parturition.

French, M. H.

THE NUTRITIVE VALUE OF SOME EAST AFRICAN PIG FOODS.
Ann. Rept. Dept. Vet. Sci. Animal Husbandry, Tanganyika Territ. 1935, 83-98; C.A. 31, 3967 (1937).

Data are given on the chem. compn. and the digestibility of East African maize, barley, wheat, buckwheat, wheat bran, field peas, pigeon peas, peanut meal and meat meal. The digestibilities and feeding values of these foods do not differ significantly from the values recorded in other parts of the world.

French, M. H.

THE NUTRITIVE VALUE OF GROUNDNUT CAKE MADE BY PRIMITIVE METHODS
Tanganyika Territory, Ann. Rept. Dept. Vet. Sci. 1934, 83-5; C.A. 30, 1141 (1936).

On the dry basis, samples of groundnut cake made in Tanganyika by primitive methods and modern methods contained crude protein 53.19, 46.24-51.31; true protein 51.36, 44.50-50.51; amides 1.83, 0.80-1.74; Et_2O ext. 8.89, 4.71-4.76; N-free ext. 27.86, 23.31-36.75; crude fiber 4.76, 4.77-5.64; total ash 5.30, 5.85-6.66; and SiO_2 0.68, 1.51-2.24%, resp. As detd. by expts. with sheep, the digestibility coeffs. of the samples were for crude protein 91.08, 92.29-93.62; Et_2O ext. 82.88, 83.08-94.39; N-free ext. 96.36, 95.62-99.58; crude fiber 80.74, 82.08-90.77; org. matter 91.36, 92.57-95.83; and dry matter 87.20, 89.54-94.09%, resp.

Gouin, R.

NUTRIENT VALUES OF PROTEINS OF DIFFERENT ORIGINS.
Compt. rend. acad. agr. France 22, 386-92(1936); C.A. 32, 3457 (1938).

The N retained and excreted by pigs on special diets was detd. and from this the digestibility, retention and utilization coeffs. were calcd. Barley is the best cereal, while soybean, pea and groundnut meals are the best legumes.

Holmes, A. D.

DIGESTIBILITY OF PROTEIN SUPPLIED BY SOY BEAN AND PEANUT PRESS-CAKE FLOURS.
U.S. Dept. Agr., Bull. 717, 28 pp.(1918); C.A. 12, 2605 (1918).

The expts. were made with normal young men engaged in moderately active pursuits. The soy bean and peanut flours were eaten in the form of biscuits as a part of a simple mixed diet. None of the subjects reported any digestive or other physiological disturbances. The proteins were utilized satisfactorily by the human body; 85% of the protein of soy-bean flour in the ground cake was digestible and 86% of the peanut protein. The digestibility of the proteins from soy bean and peanut cake compares very favorably with that of cereal proteins and is somewhat higher than that of some other legume proteins. The subjects ate an average of 70 g. daily of soy-bean protein, and in 4 expts. with peanut flour the subjects ate an av. of 65 g. of peanut protein daily without any physiological disturbance. It is stated that it is desirable to use these oil mill by-products as human food rather than for stock feeding and fertilizing purposes.

Janson, T. C. P. and Donath, W.F.
THE VITAMIN A CONTENT OF DIFFERENT INDIAN FOODSTUFFS AND THE VALUE OF THE PROTEINS OF THE LATTER AS A SUPPLEMENT TO THE PROTEINS OF RICE.
Meded. Dienst Volksgezondh. Dienst Nederland. Indie 1924, 46-93; Expt. Sta. Record 52, 64-5; C. A. 19, 2517 (1925).

Foods in common use in the East Indies were tested for their value as sources of proteins and vitamin A by being fed to rats as supplements to a diet of polished rice. In general the curative method was used, i. e., the food to be tested was not added to the ration until the animals had ceased growing and in many cases had developed xerophthalmia. To det. whether failure to grow was due to protein or vitamin deficiency, cod-liver oil was added to all diets in which growth had ceased. From the results reported, a classification of the various foodstuffs with respect to vitamin A has been made along the lines noted in a study of vitamin B (C.A. 18, 1691):(1) Foodstuffs very rich in vitamin A, of which the addn. of from 1 to 5% on the dry basis is sufficient to supplement satisfactorily a vitamin-A-free basal diet. Among the food materials placed in this group, with the estd. amts. for curing xerophthalmia, are the following fruits: banana 0.5, sapodilla 1, papaya 1, and avocado from 0.5 to 1 g. The vegetables included in this group are cowpeas (dried and powd.) 3, leaves of cowpeas dried 3, cassava leaves (boiled and dried) 5, pumpkin leaves (boiled and dried) 1, fresh pumpkin from 1 to 2, boiled and dried pumpkin 5%, chayote fruit or leaves (boiled and dried) 5, and fresh cucumber from 5 to 10 g. Animal products in this group include ducks' eggs (dried and sealed) 3, butter preserved in tins 5, and cod-liver oil 0.5%. (2) Foodstuffs having so little vitamin A as to be insufficient to prevent the symptoms of vitamin A deficiency when used exclusively. In this group are placed rice (polished and unpolished), corn (at least the white variety), coconut press cake, and peanut press cake. (3) Food materials which do not furnish sufficient vitamin A when fed at a level of from 5 to 10%, but might prove sufficient if given in larger amts. In this group are placed meat, soybeans, dried fish and shrimps, and palm oil. Definite conclusions are not drawn concerning the protein values of the foods tested, although it is considered that the proteins of soy beans are of greater value than those of meat or dried fish. Materials recommended as best fitted to supplement the deficiencies of rice in vitamin A are bananas, fresh or boiled vegetables, and ducks' eggs. It is estd. that the use of 1 banana daily is sufficient to prevent symptons of vitamin A deficiency on a diet consisting chiefly of rice.

Johns, Carl O.
THE VALUE OF THE PEANUT PROTEINS.
Am. Food J. 14, No. 4, 21(1919); C.A. 13, 1723 (1919).

A popular article in which it is stated that feeding expts. with rats show that peanut flour made from the press cake when fed as the only source of protein in an otherwise adequate diet produces growth at a normal rate. J. recommends the use of bread containing 25% peanut flour. The coeff. of digestibility of the protein is 89%, of the fat 96%, and of the carbohydrate, 97%.

Jukes, Thomas H.

BIOLOGICAL ASSAY OF LACTOFLAVIN WITH CHICKS.

J. Nutrition 14, 223-33(1937); C. A. 31, 8620 (1937).

diet similar to that used by Norris, et al. (C. A. 31, 135) was deficient in both lactoflavin and the filtrate factor. Addn. of cryst. lactoflavin to the diet resulted in provoking a dermatitis in chicks. Max. growth on basal diet No. 96 required the addn. of about 0.6 mg. of cryst. lactoflavin to 100 g. of the diet. Growth response was roughly proportional to the amt. of lactoflavin fed. The lactoflavin content of several feeding stuffs is reported in terms of a chick unit based on chick growth and which is equiv. to 1/10 of the daily amt. which will just provide the maximal growth under the conditions described. The unit was approx. equal to a modified Bourquin and Sherman unit of "vitamin G." Chick requirement for max. growth was about 100 units per 100 g. of diet. Values for the following feeds are given in units of lactoflavin per g.: brewers' yeast 14, young alfalfa sheets 2 (fresh basis), lawn clippings 8 (dry basis), dry skim milk 10, alfalfa leaf meal 6, dehydrated alfalfa meal 8, wheat germ 3.2, soybean meal 2.4, sesame meal 1.7, hempseed meal 1.2, peanut meal 1.1, cane molasses 0 and whey adsorbate 48-68.

King, D. F. and Cottier, G. J.

SUPPLEMENTAL VALUE OF PEANUTS TO THE LAYING RATION (OF HENS).

Ala. Agr. Expt. Sta., 45th Ann. Rept. 23-4(1934); C.A. 30, 1095 (1936).

Hens fed peanut meal as the sole protein supplement deposited a very soft fat in their bodies in comparison to hens fed a supplement of skim milk. The eggs of the peanut-fed birds also contained a very soft fat. The addn. of skim milk to the peanut ration so as to supply 50% of the supplementary protein resulted in higher egg production, body wt., egg size and egg quality.

King, D. F. and Cottier, G. J.

VALUE OF PEANUTS AND PEANUT MEAL IN RATIONS FOR CHICKENS.

Ala. Agr. Expt. St. Circ. 80, 3-13(1937); C. A. 32, 974 (1938).

Hens fed all the corn and peanuts they would eat gave very low egg production and unsatisfactory body wt. Ground peanuts served as a satisfactory source of protein when supplemented by skim milk powder or dried buttermilk to the extent of 50% of the total protein. Rate of growth of poultry was considerably improved where peanut products were supplemented with animal proteins.

Kuhn, G. and others

DIGESTIBILITY OF FRESH BREWER'S GRAINS AND MEAT MEAL, EARTH NUT CAKE, EXTRACTED CALUMBA AND FENNEL SEEDS, RYE BRAN AND DRIED GRAINS, MICE MEAL, COTTON SEED MEAL, EXTRACTED LINSEED, COCOA NUT MEAL, AND POPPY CAKE.

Landw. Versuchs-Stat., 44, 1-187; B.A. 1894, ii 389

The results were obtained by direct experiments with bullocks during the years 1873-1892. The amount and composition of food and faeces, the live weight of the animals, etc., are given in tables.

Maynard, L. A., Treman, F. J., and Chen, T. C.
THE FACTOR DEFICIENCY OF CERTAIN PROTEINS OF COTTONSEED AND CERTAIN OTHER FEEDING STUFFS, WITH SPECIAL REFERENCE TO RICE BRAN.
J. Biol. Chem. 55, 143-55(1923); C. A. 17, 2053 (1923).

Rats weighing 50 g. were placed upon diets contg. 9% protein. The gain in wt. per g. of protein eaten during the next 12 weeks was, if the protein was furnished by corn meal, 1.18 ± 0.025 g; if by corn meal and linseed oil meal, 1.21 ± 0.052 g.; if by corn meal and cottonseed oil meal, 1.23 ± 0.046 g; if by corn meal and peanut oil meal, 1.46 ± 0.052 g.; if by corn meal and soybean oil meal, 1.75 ± 0.040; if by corn meal and rice bran 1.55 ± 0.050 g.; if by peanut oil meal alone, 1.45 ± 0.046g.; if by rice bran alone 1.47 ± 0.055 g. Both peanut oil meal and rice bran were superior to corn meal but a mixt. of corn meal and rice bran was even better, indicating a mutually supplementing action that was not apparent in the case of peanut oil meal and corn meal. Data for soybean oil meal alone were not obtained, so no conclusion can be drawn regarding a possible supplementary action.

Morris, Samuel and Wright, Marion C.
THE NUTRITIVE VALUE OF PROTEINS FOR MILK PRODUCTION. II. A COMPARISON OF THE PROTEINS OF BLOOD MEAL, PEANUT MEAL, DECORTICATED EARTH-NUT CAKE AND A MIXTURE OF DECORTICATED EARTH-NUT CAKE AND FLAKED MAIZE.
J. Dairy Research 5, 1-14(1933); C. A. 28, 5565 (1934); cf. C. A. 27, 4565.

When minimal quantities of protein are fed in the production rations of milking cows, a deficiency of lysine or tryptophan will lead to a marked reduction in yield of milk. The feeding of lysine or tryptophan-deficient diets causes a marked increase in urinary N, indicating poor utilisation of food protein. Feeding of diets contg. adequate quantities of these amino acids reduces the urinary N, indicating efficient protein utilization. The utilization of body tissue in an attempt to maintain normal milk production on a deficient protein diet is shown by the high creatinine excretion. A new formula has been devised for calcg. the relative biol. values of different proteins for milk production. By applying this formula to the materials studied, the following biol. values were obtained: Blood meal 75, peanut meal 64, bean meal 59, meat meal 55, decorticated earth-nut cake plus flaked maize 52, decorticated earth-nut cake 50, and linseed-oil meal or linseed cake 46. These values refer not to the pure foods but to these supplemented by oats and fed with a maintenance ration of const. compn. There is a close correlation between the biol. value of the ration and its content of lysine or tryptophan.

Schmidt, J., v. Schleinitz, M. Freiin and Lagneau, E.
NITROGEN DEPOSITION IN GROWING PIGS BY FEEDING WITH DRY YEAST, GROUND SOY BEANS AND PEANUT MEAL.
Diedermanns Zentr. B. Tierernahr. 6, 281-91 (1934); C.A. 28 6781 (1934).

Metabolism expts. were carried out on pigs at 5 different stages of life to det. the deposition of N through feeding with dried yeast, ground soy beans and peanut meal. Each group consisted of 3 pigs. All animals came from the same breed and partly from the same litter. Dried yeast and peanut meal proved to be superior to ground soy beans. The daily deposition of N in the av. of the 5 periods was 13.69 g. in the yeast group, 13.22 g. in the peanut-meal group and 11.71 g. in the soy-bean group. The fattening period from about 50 kg. up to 150 kg. live weight lasted 196 days with yeast feeding, 207 days with peanut feeding and 252 days with soy-bean feeding.

Sherwood, F. W. and Halverson, J. O.
VITAMIN B IN COTTONSEED MEAL.
N. Car. Agr. Expt. Sta., 46th Ann. Rept. 44-5(1933); C.A. 30, 511 (1936).

Five samples of cottonseed meal averaged 3-4 International Units of vitamin B per g. Fleischmann's yeast contained 6 units and Northwestern yeast 12.5 units per g. Peanut meal contained 2-2.5 units per g. Both yeast samples were of equal vitamin G potency. Cottonseed and peanut meals were 12.5% as rich as the yeast in vitamin G.

Sherwood, F. W. and Halverson, J. O.
A CRITICAL EVALUATION OF THE RAT-GROWTH METHOD FOR DETERMINING VITAMIN B AND ITS CONTENT IN MEALS FROM CERTAIN OILY SEEDS.
J. Agr. Research 56, 927-34(1938); C.A. 32, 7536 (1938).

Soybean meal, peanut meal, cottonseed flour, cottonseed meal and linseed meal are good sources of vitamin B. The values ranged from 1.1 I.U. of vitamin B per g. for a sample of soybean meal to 5.4 units per g. in one sample of linseed meal. Cotton-seed-hull bran does not contain an appreciable amt. of vitamin B. Raw shelled peanuts contain 2.4 I.U. per g. A statistical study of the results of the assays by the rat-growth method showed that there is a seasonal variation in growth response to a given dose of vitamin B. This variation is most marked when the amt. of vitamin B is only slightly greater than that required for maintenance. Rats apparently need less vitamin B in the spring and early summer than in late summer and autumn. The relation between vitamin B dosage per day and total gain in the assay period may be expressed by linear equation, provided the total gain is less than 50 g. in 4 weeks and the daily vitamin B dosage lies between 0.6 and 1.4 I. U.

Sjollema, B. and Seekles, L.
THE ETIOLOGY OF GRASS TETANY: THE INFLUENCE OF HIGH PROTEIN INTAKE.
Arch. Wiss. prakt. Tierheilkunde, 66, 65-9 (1933); C. A. 28, 2786 (1934).
Cows kept on a very high protein diet (earth nut, soy and meat gluten) showed toxic symptons resulting in some cases in death. The total blood N was increased; proteins, urea and amino acids were normal. The urinary constituents were markedly changed including high sugar excretion indicating kidney damage.

Smuts, D. B.
PROTEIN STUDIES. PLANT PROTEINS. I. A COMPARATIVE STUDY OF THE GROWTH-PROMOTING PROPERTIES OF THE PROTEINS OF PEANUT MEAL, SESAME MEAL, COPRA MEAL, LUCERNE MEAL AND COTTONSEED MEAL.
Onderstepoort J. Vet. Sci. Animal Ind. 10, 193-205(1938); C. A. 32, 9193 (1938).
By means of the paired feeding method on rats, it was shown statistically that the protein of cottonseed meal is superior to that of peanut meal, whereas no statistical difference could be detected between the proteins of peanut meal and copra meal, and peanut meal and sesame meal. There was evidence that the protein of lucerne meal is inferior to that of peanut meal.

Smuts, D. B. and Malan, A. I.
PROTEIN STUDIES, PLANT PROTEINS. II. THE BIOLOGICAL VALUES OF LUCERNE MEAL, SESAME MEAL, PEANUT MEAL, COPRA MEAL, COTTONSEED MEAL, AND OATMEAL.
Onderstepoort J. Vet. Sci. Animal Ind. 10, 207-19(1938); C. A. 32, 9193 (1938).
As detd. by means of N metabolism studies on rats, the biol. values of the proteins of oatmeal, cottonseed meal, peanut meal, sesame meal, copra meal and lucerne meal were 84, 81, 72, 71, 69, 60 and 61, resp., the last 2 figures being results obtained for lucerne meal in 2 different expts. In the same order, the true digestibilities of the proteins were 100, 92, 90, 92, 89 and 74% resp.

Smuts, D. B., and Marais, J. S. C.
PLANT PROTEINS. III. THE SUPPLEMENTARY EFFECT AMONG CERTAIN PLANT PROTEINS.
Onderstepoort J. Vet. Sci. Animal Ind. 11, 151-9 (1938); C. A. 33, 5455 (1939); cf. C. A. 32, 9193 .
By means of the paired feeding method, it was shown that for rats the addn. of cystine to lucerne significantly enhances the growth-promoting properties of the latter and that when peanut meal is supplemented by oatmeal the resulting protein mixt. is superior to peanut meal alone. N metabolism studies conducted on the same rations showed that the incorporation of 0.2% cystine in a lucerne ration definitely increases the biol. value of lucerne, that no supplementation exists between peanut meal and lucerne meal and that supplementation occurs between peanut meal and oatmeal.

Suzuki, Umetaro, Matsuyama, Yashihiko, and Hashimoto, Nabetaro
RELATIVE NUTRITIVE VALUES OF VARIOUS PROTEINS CONTAINED IN JAPANESE FOOD ARTICLES.
Sci. Papers Inst. Phys. Chem. Research 4, 1-47 (1925); C. A. 20, 1836 (1926).

Results of other authors are quoted throughout the article, with references, and analyses of numerous proteins are included. Young rats, fed a diet of butter (I), starch (II), protein-free milk (III) and gelatin, 14%, did not grow, but they grew if cystine, tyrosine and tryptophan were added to their rations. Cystine or cysteine, lysine, tryptophan, tyrosine or phenylalanine and other amino acids are necessary for the nutrition of animals. Young rats fed a diet of I, II, III, Ca lactate, Ca phosphate and a mixt., 14%, contg. 14 amino acids and $(NH_4)_2CO_3$, did not grow, nor did rats fed I, II, III and a mixt. of hydrolyzed horsemeat protein and cystine. With Witte peptone or "Eroptan" as the source of amino acids, rats grew. Normal growth resulted when rats were fed I, II, III and protein, 10%, from whale, cod, bonito, the blood-red flesh of bonito, sardine, cuttle-fish, "talapa" crab, salmon, herring, tunny, shark, mackerel, globefish, halibut, crayfish, ligament of the scallop shell, and sea-bream. When fish protein, 7%, was fed, there were slight differences in development; herring, salmon, dried bonito, ligament of scallop shell, crayfish, crab, etc., gave nearly the same results as beef, while tunny, mackerel, shark, globefish, etc., gave inferior results. The nutritive value of fish does not run parallel with the market price. Dried and canned fish and canned beef are as nutritious as the fresh products. Rats fed I, II, III and protein from polished rice did not grow as well as those fed fish protein. Better results were obtained with protein from unpolished rice. Rice protein, 10%, from polished rice, is nearly equal to flesh proteins, 7%. Normal growth resulted with I, II, rice flour and rice protein (total protein, 8.5%) if beer-yeast, 2%, was added to the diet, or with protein, 6.5%, if fish or horsemeat protein, 2%, was added. For the maintenance of fully grown rats, meat, milk, or fish protein, 5-6%, or rice protein, 7% is necessary. Good growth resulted with wheat gluten, 14%, and diamino acids, 0.7%, in the diet; poor growth with wheat gluten, 7%; tolerably good growth with bread or wheat protein, 6.5%, and meat protein, 2%; good growth with I, Osborne's salts, $CaCO_3$, starch, beer-yeast, 2%, and bread containing protein, 10%. Better results were obtained if a small amount of meat or milk was used with wheat or rice than if the whole grains are used as sources of protein, but half-polished rice should be used because polished rice contains no vitamin B. Soybean oil contains vitamin A. Moderately good growth resulted with I, II, III and protein, 10%, in fat-free "tofu" from soy beans, and with I, Osborne's salts, $CaCO_3$, oryzanin and protein, 10% (in polished rice, 80%, and "tofu," 17%). Rats fed rations containing I, II, Osborne's

salts and protein, 10 and 8%, in oat flour, attained almost the standard growth. Oats contain enough vitamin B but not enough Ca. Most of the rats fed rations containing protein, 10%, in rye flour, died in 4-5 months, probably because of Ca or Vitamin B deficiency. Rats fed I, II, III and protein, 14%, in fat-free peanut powder, grew at the normal rate. Peanut protein seems to be better than rice protein. The relative nutritive value of about 25 proteins is shown graphically.- The nutritive value of proteins is closely related to the content of diamino acids, especially lysine, and less closely to the content of tryptophan and other amino acids.

Timariu, Savu.

THE UTILIZATION OF PROTEIN BY GROWING CATTLE.

Landw. Vers.-Sta. 129, 124-50(1938); C. A. 32, 6698(1938).

The values for the utilization of crude protein and of the digestible portion of crude protein in hay were, resp., 38.13, 56.95; in peanut meal 72.86, 74.61; in blood meal 70.36, 74.21; in yeast 68.82, 83.38%.

Wheeler, G. A. and Hunt, D. J.

THE PELLAGRA-PREVENTIVE VALUE OF GREEN ONIONS, LETTUCE LEAVES, PORK SHOULDER AND PEANUT MEAL.

U. S. Pub. Health Repts. 49, 732-6 (1934); C. A. 28, 5505 (1934).

Canned green onions contain the pellagra-preventive factor, but in small amt.; canned lettuce leaves are a poor source, lean pork shoulder and peanut meal are good sources of this factor. Six references.

Ayyar, K. S. Viswanatha.
THE RELATIVE NITRIFIABILITY OF DIFFERENT NITROGENOUS ORGANIC MANURES IN CERTAIN SOILS OF THE CENTRAL FARM, COIMBATORE.
Madras Agr. Dept., Yearbook 1926, 85-91 (1927).-C. A. 22, 3724 (1928).

Pungam cake (Pongamia glabra), groundnut cake (Arachis hypogea), castor cake (Ricinus communis), horn meal, fish guano, and ganja cake (Cannabis indica), were used in nitrification expts. on a black cotton soil and a red garden soil. With the black cotton soil the % nitrification in 6 weeks was pungam cake 80, groundnut cake 100, castor cake 90, horn meal 12.5, fish guano 50, and ganja cake 50, while, in the same order, the % nitrification in 6 weeks in the red garden soil was 64, 84, 80, 84, 27, and 90. The cause of the high nitrification of horn meal and ganja cake in the red soil was not detd. $CaCO_3$ had no effect on nitrification in these soils. Data are given on the nitrite and NH_3 formation from the fertilizers at various periods after application.

Ayyar, S. Kasinatha
A NOTE ON THE RELATIVE AVAILABILITY OF THE NITROGEN OF OIL CAKES AS INDICATED BY POTCULTURE STUDIES.
Madras Agr. Dept., Yearbook 1926, 92-5 (1927); C. A. 22, 3724 (1928); cf. preceding abstr.

Pot expts. with ragi were carried out with groundnut castor, hoongay and ganja cakes, steamed horn meal, and $(NH_4)_2SO_4$ on a brown loam garden soil contg. N 0.036%, total P_2O_5 0.069%, and available P_2O_5 0.011%, 100 mg. of N being used in each case. With N fertilizers alone the increases in yield of grain were in the following order - groundnut, hoongay, steamed horn meal, castor, $(NH_4)_2SO_4$ and ganja cake, while with N fertilizers plus superphosphate the yield of grain was in the following order - steamed horn meal, groundnut, castor, ganja cake, $(NH_4)_2SO_4$ and hoongay. Expts. on certain soils of the Central Farm and at Koilpatti showed that superphosphate when applied alone considerably depressed the yield of grain as compared with the yield from unfertilized soil, although the soil was not rich in available P_2O_5. Favorable increases in yields of both grain and straw were obtained when N fertilizers were used in connection with superphosphate. The investigations are being continued.

Berthelot, A. and Amoureux, G.
PREPARATION OF CULTURE MEDIA USING A PEPTONE PREPARED BY THE ACTION OF PEPSIN ON PEANUT PRESSCAKE.
Bull. soc. chim. biol. 16, 1561-4; C. A. 29, 1446 (1935); cf. C. A. 25, 1865.

The prepn. and uses of peanut peptone are described. It is rich in arginine.

Berthelot, A., Amoureux, G. and Deinse, F. Van.
ADVANTAGES OF A PEPTONE PREPARED BY PEPTIC DIGESTION OF SOYBEAN PRESS-CAKE IN THE PREPARATION OF CULTURE MEDIA.
Bull. soc. chim. biol. 16, 1565-7; C. A. 29, 1446 (1935)

The peptone is prepd. like peanut peptone. It contains considerable quantities of sol. carbohydrates which make it especially suitable for certain organisms.

Berthelot, A., Doince, F. van and Amoureux, G.
REMARKS ON A CHEMICAL NATURE ON THE PROPER MEDIA FOR THE CULTURE OF THE TUBERCLE BACILLUS.
Bull. soc. chim. biol. 16; 1571-4; C. A. 29, 1446 (1935); cf. C. A. 28, 3754.
Pyruvic acid can be used to advantage in place of citric acid. Peanut peptone can be substituted for asparagine or used in addn. to it. The use of egg yolk is discussed.

Berthelot, Albert; Amoureux, G., and Petit, Denis
REMARKS ON THE COMPOSITION OF PEANUT MEAL PEPTONE AND ITS USE FOR THE CULTURE OF PATHOGENIC BACTERIA.
Bull. soc. chim. biol. 12, 1029-30 (1930); C. A. 25, 1865 (1931).
Analysis is given of a pepsin (I) and a pancreatic peptone (II), illustrating differences depending upon the method of prepn. I gave good toxin production and II did not, although both gave good growth with B. tetanus.

Cheng, Yu-Ching and Adolph, William H.
PREPARATION OF d-GLUTAMIC ACID.
J. Chinese Chem. Soc. 2, 221-4 (1934); C. A. 29, 740 (1935).
Peanut and soybean press cakes are economical raw materials for the prepn. of glutamic acid. The addn. of Cu or $FeCl_3$ catalyzes the hydrolysis of wheat gluten and increases the yield of glutamic acid-HCl.

Joachim, A. W. R.
DECOMPOSITION OF GREEN AND ORGANIC MANURES UNDER TROPICAL CONDITIONS.
Trop. Agr. (Ceylon) 66, 308-12 (1926); C. A. 20, 3768 (1926).
Max. nitrification was obtained with castor pomace and fish scrap about the 8th week, during the 10th week with peanut meal, fish guano and dried blood, and at the end of the 6th week with barnyard manure and 5 varieties of green manure. After 6-8 weeks decompn. denitrification proceeds faster than nitrification. Approx. 60% of the N in castor pomace and fish scrap, 40% in peanut meal and fish guano and 30% in dried blood were converted into nitrates in the soil. Nitrification slowed up in soils contg. less than 13.5% H_2O (3/8 satn.).

Lamy-Torrilhon.
NEW SOURCE OF SUCROSE.
Circ. hebd. fabr. sucre, Suppl., No. 2336, (Dec. 31, 1933); C. A. 28, 1563 (1934).
De-oiled peanut cake often contains as much as 10% sucrose, which can be recovered by extg. with 66% EtOH.

Ramiah, P. V. and Varahalu, T.
SUGAR CANE. III. PRELIMINARY NOTE ON THE RESPONSES OF SUGAR CANE TO DIFFERENT NITROGENOUS FERTILIZERS.
Madras Agr. J. 26, 161-5 (1938); C. A. 32, 7189 (1938); cf. Ann. Rept. Government Agr. Chem., Coimbatore 1935-36, 13.
In pot expts. using equal amts. of N, farmyard manure and castor cake tended not only to increase the no. of cane tillers but also to hasten their formation and to favor uniform maturity of the cane. $(NH_4)_2SO_4$ appeared to have a tendency to delay the formation of tillers; peanut cake had an intermediate effect. Castor cake had a particularly favorable effect on the height of the primary shoots and tillers.

Rokusho, Bunzo, Tanaka, Rihichi and Miyahara, Chiyoka.
PREPARATION OF GLUTAMIC ACID. IV. VARIOUS OIL CAKES PRODUCED IN MANCHURIA AS A SOURCE OF GLUTAMIC ACID.
J. Agr. Chem. Soc. Japan 13, 944-53 (1937); C. A. 32, 1245 (1938).

The yields of glutamic acid from various oil cakes of soy bean, cotton-seed, peanut and castor bean were compared. The yield was 11-12.5% of the amt. of crude protein in all cakes. Glutamic acid was obtained in best yield when the Soyalex was first extd. with 0.5-2.0% HCl to remove carbohydrates and ash and then hydrolyzed with 18% HCl.

Sahasrabuddhe, D. L. and Gokhale, D. H.
NITRIFICATION OF OIL CAKES IN THE TYPICAL SOILS OF THE BOMBAY PRESIDENCY.
J. Univ. Bombay 2, Pt. 2, 68-81 (1933); C. A. 28, 5569 (1934).

The value of the oil cakes used as fertilizer depends on the percentage of N and also on the rate of nitrification. A study has been made of the rate of nitrification of ordinary and fat-free groundnut cake, castor cake, and safflower cake in medium black soil, laterite soil and Goradu alluvial soil. The groundnut cake is the most easily nitrifiable of those tested and the ordinary ground-nut cake is distinctly superior in nitrification to the fat-free cake. The safflower and castor cake are similar, the castor cake nitrifying better in the medium black & laterite soils and the safflower in the Goradu soil. Ammonification and nitrification show a close relation. The medium black soil is the most active of the 3 soils exam. and the laterite soil the least active. The loss of N in the groundnut cake is the greatest in all the soils. The Goradu soil loses comparatively more N than the medium black or laterite soils.

Adler, L.

THE DETECTION OF PEANUT OIL IN OLIVE OIL.

Munich. Z. Nahr. Genussm., 23, 676-9; C. A. 6, 2056 (1912).

The addition of 5% of peanut oil to olive oil raises the temp. at which the fatty acid crystallizes from an alc. soln. about 3°. The crystn. temp. of the acids of pure olive oils is between 11.6° and 14.3°, and of peanut between 40.0° and 40.8°. Thus, 5% of peanut oil added to an olive oil with a crystn. temp. of 11.8° gives a crystn. temp. for the mixt. of 15.9°, which is 1.6° above that of the highest olive oil exam'd. The method of procedure is as follows: Saponify 1 cc. of the sample on a H_2O bath for 4 min. with 5 cc. of an 8% alc. KOH soln. (80 g. KOH + 80g. H_2O made to 1 l. with 90% by vol. EtOH) in a 100 cc. Erlenmeyer having a tube condenser 80 cm. long. Cool to 25°, add 1.5 cc. AcOH (1 vol. acid + 2 vol. H_2O) and 50 cc. of 70% by vol. EtOH. Cool to 16° and hold at that temp. 5 min., shaking constantly; if no cloudiness appears, cool to 15.5°, and again hold for 5 min.; if no ppt. appears there is less than 5% peanut oil present.

Aurisicchio, Giuseppe

NEW METHODS FOR THE IDENTIFICATION AND DETERMINATION OF PEANUT OIL IN OLIVE OIL.

Olii minerali, olii grassi, colori vernici 11, 27-8 (1931); C. A. 26, 1815 (1932).

To detect peanut oil saponify 1 cc. of olive oil in a large test tube with a reflux condenser, heat on a direct fire with 5 cc. of 15% alc. KOH, cool, add 10 cc. 90° alc., and place the tube for 2 hrs. in water at 10°, & later in a centrifuge with 3000 revolutions per min.; remove the tube, decant the liquid from the sediment of K arachidate and lignocerate, and add to this 0.5 cc. concd. HCl, d. 1.35, and 10 cc. distd. water at 80°. Let the liberated arachidic and lignoceric acids solidify on the surface of the liquid, from which they are sepd. Mix the liquid with ether to ext. the traces of the acids still remaining; pour the ether ext. on the solid fatty acids to dissolve them, filter the soln., wash the filter several times with pure ether. Crystallize the arachidic and lignoceric acids from the filtrate by evapg. the solvent; redissolve them in alc. at 90°, warm to 70°, filter, washing the filter with alc. of the same strength and temp. Cool the soln. The acids are obtained sufficiently pure to det. the m.p., which should never be under 70°. Exam. with the microscope. For the detn. treat 1.82-1.84 g. of the oil as above with double the amts. of the reagents; heat to 70° the arachidic and lignoceric acids from the 90° alc., dry over H_2SO_4 and weigh. Their wt. multiplied by 20 gives the amt. of peanut oil present.

Benz, G.

DETECTION AND DETERMINATION OF PEANUT OIL IN SESAME OIL.

Z. Untersuch. Lebensm. 75, 486-91(1932); C.A. 27, 3353 (1933).

Various methods were compared and the results tabulated. Of the qual. methods that by Alder-Lüers (König, Chemie Nahr. Genussm. 3, II, 469; cf. C.A. 25,3290) proved to be the most suitable if the sepn. temp. of 18° is observed. The quant. procedure by Bohrisch (König, Ibid 472) was not found reliable in all cases, while that by Renard-Lewkowitsch-Tortelli-Ruggeri (König, Ibid 472) gave satisfactory results at a temp. not below 16°.

Berisso, B.

USE OF THE WOOD LIGHT IN ANALYSIS. EXAMINATION OF ARGENTINE OLIVE OILS UNDER THE WOOD LIGHT AND COMPARISON WITH PEANUT, COTTONSEED, RAPE AND SUNFLOWER OILS OF DOMESTIC ORIGIN.

Rev. col. farm. nac. (Rosario) 2, 59; Anales farm. bioquim., Supl. 6, 89-90(1935); C.A. 30, 1249(1936).

The adulteration of olive oil with 3% of any of the above oils can be detected by examn. of the fluorescence produced by irradiation with light of 365 mu wave length.

Biazzo, R. and Vigdorick, Sc.

DETERMINATION OF ARACHID OIL IN MIXTURES WITH OLIVE OIL.

Napoli. Ann. chim. applicata 6, 179-85(1916); C.A. 11, 711(1917).

Arachid oil gives some chromatic reactions that are different from those of olive oil, but none is characteristic, because other oils also give the same, and even olive oil, of somewhat putrid quality, gives them, but in less degree. The physicochem. consts. of olive oil and arachid oil are so close that it is possible to find samples of each which have the same analytical values. The presence of arachid oil may be inferred, however, by identifying in it arachidic acid, or, more exactly, the mixt. of arachidic and lignoceric acids. The methods proposed so far to accomplish this purpose are based: (1) on crystg. the fatty acids several times from alc. until a pure mixt. of the 2 acids is obtained--the addition of 5% arachid oil can be thus detected; (2) on the slight soly. of their K soaps in cold alc.; these methods are simply qual.; (3) on the sepn. of the mixt. of the acids directly from the alc. soln. of the soaps properly dild. with alc. and acidified. These methods are not of great value either for qual. or quant. purposes. The authors' method is a modification of a method of the 1st class, and is as follows: Weigh out 20 g. of the oil in a 250 cc. flask and add 40 cc. alc.-KOH(40 cc. 50% KOH with 100 cc. 96% alc., filtering a day later through glass wool), mix and heat carefully on a sand bath or on a wire gauze with small flame, using a reflux condenser until the liquid is homogeneous. Heat slowly for 5 min. longer and transfer the soap soln. completely with the aid of 150 cc. H_2O to a 500 cc. separatory funnel which has a short stem so that 3/4 of the funnel may be immersed in a bath of running H_2O. Set free the fatty acids by addition of dil. H_2SO_4, and ext. with 200 cc. Et_2O. Remove the aq. layer and wash the Et_2O soln. twice with 150 cc. H_2O.

Add to the washed liquid (which may still contain a little acid) 50 cc. 30% aq. neutral $Pb(AcO)_2$ soln., agitate the whole thoroughly for 5 min., and allow to rest till the subnatant aq. layer is free of emulsion. Sometimes this may be brought about by giving the liquid a slight rotatory movement. Remove the aq. layer, immerse the funnel in a H_2O-bath at 15° for 1/2 hr., decant the limpid Et_2O liquid on a dry filter without disturbing the ppt., if possible. If more aq. liquid has sepd. out, remove it, then agitate the ppt. with 75 cc. Et_2O, and after cooling at 15° for 1/2 hr., decant as before. Finally bring the ppt. on the filter, wash with cold Et_2O till the wash liquid leaves a negligible residue. Spread the filter open on a glass plate, and wash the ppt. into the seperatory funnel with a jet of Et_2O, using about 200 cc. of the latter, and decompose by shaking twice with 20% HCl, 100 cc. each time. Wash the Et_2O layer repeatedly with H_2O to remove all acid, dry with $CaCl_2$, filter into a beaker, wash the filter with additional Et_2O, distil the solvent, and remove the last traces with a current of air. Dissolve the fatty acids with slight heat in 50 cc. 90% alc. contg. 10 drops N HCl per l., maintain the liquid for 1/2 hr. in a bath at 15°, collect the crystals sepg. out, which dissolve again in 25 cc. alc., and treat as before. (Using pure olive oil, the authors did not obtain any crystn. at this point.) Dissolve again the sepd. crystals in 12.5 cc. alc., cool as before, and finally dissolve the new crystals in 5 cc. alc., and allow to crystallize spontaneously at the ordinary temp. In their expts., the authors obtained here sufficient fatty acids from a mixt. of olive oil with about 5% arachid oil to d.t. the m. p., which was 73.5-74°. In quant. detns., the authors, following the method of Tortelli and Ruggeri (see Ann. Lab. chim. centr. Gabelle IV, 173), obtained 4.65% arachidic and lignoceric acids (T. and R. give 4.77%) from genuine arachid oil, and proportionate figures from mixts. of olive oil with 50% and 25% of arachid oil.

Blarez

INVESTIGATION OF PEANUT OIL IN OLIVE OIL.

Répert. pharm., (3), 19, 61-62, from Bull. soc. pharm., Bordeaux, Nov., 1906; C.A. 1, 2827(1907).

Two cc. of the sample for examination are saponified with 20 cc. of 5% alcoholic potash for 10 min.; the solution is filtered into two dry test tubes, into one of which is also placed 2 cc. of absolute alcohol and both tubes are kept 24 hrs. in a cool place. If the amount of peanut oil is above 6%, it is easily detected in the first tube, if less than 6%, the tube to which the absolute alcohol was added, will show the precipitate. The test is not applicable to oil containing more than 10% cotton oil.

Bohrisch, P.

THE DETECTION OF PEANUT OIL IN OLIVE OIL.

Pharm. Zentr., 51, 361; through Chem. Zentr., 1910, II, 113; C.A. 5, 927(1911).

Saponify 10 cc. oil with 125 cc. 0.5 N alc. NaOH, let stand at ordinary temp. 4-5 hrs. Turbidity shows the presence of more than 10% peanut oil or more than 20% sesame or cottonseed oils. In case of ppt. heat in H_2O bath until clear, otherwise neutralize direct with conc. HCl, place in H_2O at 15° for 10 min., filter through 12 cm. paper; a

small quant. of white ppt. on paper denotes the presence of either less than 20% of peanut oil or less than 50% sesame or cottonseed oil. If the filter is almost filled with a white granular ppt. then some of the oils are present in above quant. Place a portion of the filtrate in H_2O at 10°. No ppt. after 30 min. denotes the absence of peanut oil and of more than 10% of sesame and cottonseed oil. If ppt. forms, place the remainder of filtrate in ice box over night, dissolve ppt. in 90% alc., heat on H_2O bath a few min. and let stand at room temp. for 1 hr. If a flocculent ppt. forms and the Baudouin react. was negative peanut oil is present (sensitive to 5%). Arachic acid may be separated as follows: Saponify 20 g. oil with 250 cc. 0.5 N KOH, neutralize while still hot with HCl (phenolphthalein), warm again on H_2O bath, filter off KCl and place in ice chest over night. Filter off K arachate, dissolve in 90% alc., place in ice chest for several hours, siphon off the liquor, treat ppt. with 20-30 drops conc. HCl. Warm slightly, shake out pptd. arachic acid with Et_2O, dry and weigh. The m. p. may be detd. after recrystallizing.

Bose, A. C.

PRELIMINARY NOTES ON THE STEROL IODINE VALUES OF OILS AND FATS BY THE BOLTON AND WILLIAMS METHODS.

Analyst 60, 160-3(1935); C.A. 29, 3540(1935).

The method of B. and W. (C.A. 24, 1755) serves to distinguish between 3 classes of oils by detg. the sterol-I values. The values for cocogem and coconut oil (group I); "vanashpati" or vegetable ghee (group II); linseed oil, tori-seed oil, mixed mustard oil, arachis oil and castor oil (group III) and cod-liver oil (II and III) were detd. Since the values for animal ghee lie below those for cocogem and coconut oil, adulteration of ghee with oils of group I cannot be detected by the sterol-I value. On the other hand, this value serves to detect adulteration with oils of the other groups.

Bunce, Edwin H.

DETECTION AND DETERMINATION OF SESAME OIL WHEN MIXED WITH OTHER EDIBLE OILS WITH PARTICULAR REFERENCE TO PEANUT OIL.

Analyst 55, 568(1930); C.A. 24, 5521(1930).

The following modification of Baudouin's test is recommended. Take 5 g. of oil and 5 cc. of concd. HCl in a separator. Add 4 drops of 1% furfuraldehyde in alc., shake 2 min. and allow to stand 3 min. Run off the acid layer into a 50-cc. Nessler tube and wash the oily layer with addn. of HCl. Make up to the mark with HCl and compare the red color with standards which have been subjected to the same treatment. In this way quantities of sesame oil in a given mixt. can be estd. up to 40% with an accuracy of 5%. With mixts. of sesame and peanut oils, Bellier's test is carried out in addn. and in this way the peanut oil content estd. The results then usually add up to about 100 when a mixt. of these 2 oils is at hand.

Caulkin, H. A.

BELLIER'S MODIFIED TEST FOR PEANUT OIL.

Analyst 50, 285(1925); C.A. 19, 2753(1925).

It is not safe to infer the presence of peanut oil in olive oil merely on the evidence of B.'s test. In doubtful cases confirmation should be obtained by the Renard test or one of its modifications.

Creach, P.

ADULTERATION OF CHAD BUTTER, ITS DETECTION, VALUE OF THE VALENTA NUMBER.

Ann. falsi. 32, 4-16(1939); C.A. 33, 8838(1939).

The various forms of adulteration likely to be encountered in this butter, made in Chad, are discussed. The most frequent ones are the addn. of arachis, sesame and Balanites aegyptica. Sesame oil is readily detected in amts. of 2.5% (and even as little as 1-1.5%) by the Villavecchia and Fabris color test. The Valenta test (crit. soln. temp. in glacial AcOH) is suitable for detection in the field of the above oils, as well as of castor oil and beef and mutton fats, which also may occasionally be encountered as adulterants. The Valenta no. varies linearly with the amt. of adulterant present. The technique of the test is described in detail.

De Conno, E. and Finelli, L.

THE FRACTIONAL SAPONIFICATION OF FATS. III. THE IDENTIFICATION OF THE MORE COMMON ADULTERANTS FOR LARD.

Ann. chim. applicata 22, 407-16(1932); C.A. 26, 6030(1932); cf. C.A. 25, 5585.

Pure lard, and lard with 5, 10, 25 and 50% each of cacao butter, peanut oil, sesame oil, were fractionally saponf., and the phys. consts. of both the saponf. and unsaponf. parts detd. The sapon. no., I_2 no., Crismer no., the m.p. of the fat and the av. mol. wt. of both the saponf. and unsaponf. fat were detd. The difference in these 2 av. mol. wt. values is a good measure of the amt. of adulterant, the presence of 5% of any of the fats above being sufficient to give a detectable difference in the mol. wt. value. IV. The more common adulterants of butter. Ibid 417-26.- Samples of butter, with 5, 10, 25 and 50% each of margarine, and cacao butter were saponf. fractionally. It was not possible to test the presence of margarine by this method, for with insufficient alkali present, only the glycerides of the volatile acids hydrolyze. However, the presence of cacao butter can be detected by detg. the av. mol. wt. of the insol. non-volatile acids present.

Dickhart, W. H.

THE DETECTION OF OLIVE OIL IN SOME REFINED VEGETABLE OILS.

Am. J. Pharm. 95, 604-6; Cotton Oil Press 7, No. 6, 34(1923); C.A. 17, 3793(1923).

D. recommends the following method for the detection of olive oil: Soln. "A". Pour slowly one part of concd. H_2SO_4 into 4 parts of abs. alc., placing the graduate in cold water if necessary to reduce the temp. Soln. "B." A 2% alc. soln. of furfural. Place 5 cc. of sample in a test-tube, add 5 cc. of soln. "A" and shake to form an emulsion; then drop into this emulsion 10 drops of soln. "B" and again shake. A pink color at this stage indicates sesame oil. Place the tube in the hot water bath, which must read 94° to 95°, and heat for 1-1/2 min., shaking every few sec. Remove from the bath and add 10 cc. of cold water. Again shake and allow it to stand for 5 to 10 min. A red color of the soln. indicates olive oil. All the other oils (corn, castor, china wood, hemp-seed, hapok, peanut, perilla, palm, palm-kernel, lumbang, mustard, rape-seed, tea-seed, linseed, soybean, coconut, and tobacco-seed) tested gave a milky soln. when treated in the same way.

Dickhart, W. H.

COLOR REACTION OF (FATTY) OILS.

Oil & Fat Ind. 7, 391(1930); C. A. 25, 3505(1931).

Ten cc. of the oil, acidified with 1 cc. of conc. HCl is shaken for 1-2 min. with 10 cc. of amyl alc., and the liquids are allowed to sep. Soybean oil (also admixed with 9 vols. of tung oil) produces a deep blue color persistent for 24 hrs. Linseed and perilla oils give a blue color fading in 24 hrs. to yellow and pale blue resp. Olive, cottonseed, arachis, sunflower, rape (yellow after 24 hrs.) and tung oil solns. are colorless. Crude cottonseed and palm oils give red colors.

Dietze, F.

TEST FOR OLIVE OIL.

Pharm. Ztg., 54, 260; C.A. 3, 1820(1909).

A mixture of phloroglucinol and HNO_3 has been employed to detect foreign oils in olive oil, the test depending upon the formation of a "raspberry-red" color if foreign admixtures were present. Olive oil alone (of all the common oils likely to be employed as adulterants of olive oil) was supposed not to give the test. The author has applied the test to olive oils of known purity and finds that the test is fallacious, a deep "raspberry-red" color being produced in every case. With olive oil, however, the color disappears after a time. "Raspberry-red" colors were produced by the pure oils of peanut, almond, rape and poppy while linseed oil, peach-kernel oil and sesame oil each gave a carmine-red color. Cotton oil gave a deep violet-red color but this soon faded. Mixtures of pure olive oil with 10% and 20% peanut oil and with 10% sesame oil were, in general, indistinguishable from pure olive oil.

Evers, Norman.

THE DETECTION AND ESTIMATION OF ARACHIS OIL.

Analyst, 37, 407; (1912). C.A. 7, 662(1913).

J. Bellier (Ann. chim. anal., 4, 4(1899)) suggested a qual. test for arachis oil in olive oil, which was later modified by Hansfield (Z. Nahr. Genussm., 17, 57; Adler, C.A., 6, 2656; and Franz, Beitrage Z. Nachweis und Z. Kenntnis d. Erdnussoles. München,1910). This modified test is approx. quant. but gives low results on account of the solubility of the arachidic and lignoceric acids. The test can be made more accurate if modified as follows: Weigh out 5 g. of the oil into a sapon. flask, add 25 cc. of alc. KOH (80 g. KOH dissolved in 30 cc. H_2O and dil. to 1 l. with 90% alc.) and saponify for about 5 min. under a reflux condenser. To the hot soap soln. add 7.5 cc. of AcOH (1 vol. glacial AcOH to 2 vols. H_2O) and 100 cc. of 70% alc. containing 1% (by vol.) HCl and cool to 12-14° for 1 hr. Filter and wash with 70% alc. containing 1% HCl at 17-19°. Wash until the filtrate gives no turbidity with H_2O, the washings being measured. Dissolve the ppt. in 25-70 cc. of hot 90% alc. and cool to a fixed temp. between 15° and 20°. If the crystals appear in any quantity allow to stand at this temp. for 1-3 hrs., filter, wash with a measured vol. of 90% alc. (about half the vol. used for crystn.) and finally with 50 cc. of 70% alcohol.

Wash the crysts. with warm ether into a weighed flask, distill off the ether, dry at 100° and weigh. If the m.p. is lower than 71°, recryst. from 90% alc. Add the correction for the solubility in 90% alc. as in Renard's process, from the table given by Archbutt (Allen's Commercial Organic Analysis, 4th Ed., Vol. II, p. 94) and also for the total vol. of 70% alc. used in pptg. and washing (including the 100 cc. added in the first instance) from the table quoted below. If there are no crysts. from 90% alc. or if they are only in very small amt., dil. with H_2O to 70% (alc. content). Crystallize at 17-19° for an hr., filter, wash with 70% alc. and weigh as before, adding correction for the 70% alc. from following table. If the m.p. is below 71°, recryst. from a small quantity of 90% alc. or again from 70% alc.

Wt. of acids corrected for 90% alc.	Correction per 100 cc. 70% alc.		
	M.p. 71°.	M.p. 72°.	M.p. 73°.
Above 0.10 g.	0.013 g.	0.008 g.	0.006 g.
0.08 - 0.10 g.	0.011	0.007	0.006
0.05 - 0.08 g.	0.009	0.007	0.005
0.02 - 0.05 g.	0.007	0.006	0.005
Less 0.02 g.	0.006	0.005	0.004
Factor for conversion of % fatty acid to arachis oil	17	20	22

Evers, Norman

DETECTION OF PEANUT OIL IN OLIVE AND ALMOND OILS.

Analyst 62, 96-101(1937); C.A. 31, 2944(1937).

The Brit. Pharm. method of detecting peanut oil in olive oil and almond oils depends on a sorting test and a confirmatory test. A pos. test in the first case is not proof that peanut oil is present; the sepn. of arachidic acid and detn. of its m.p. alone give reliable evidence. Of 26 representative olive oils, 16 gave pos. results in the sorting test but in only one was the presence of peanut oil confirmed. By the following modified procedure the results are much better. Saponify 1 ml. of oil with 5 ml. of 1.5 N KOH in alc. by heating 5 min. on the water bath with reflux condensation. Add 50 ml. of 70% EtOH, 0.8 ml. of HCl (d. 1.16), heat to dissolve any ppt. and cool at the rate of 1° per min., with const. stirring, until the temp. is 9°. If the liquid remains clear, peanut oil is absent. When dealing with almond or apricot oil it is necessary to cool to 4°.

Fachini, S. and Doria, G.

THE DETECTION OF PEANUT OIL IN OLIVE OIL.

Chem. Ztg., 34, 994; C.A. 5, 3703(1911).

The method differs from that of Tortelli and Ruggeri (Ibid., 34, 689) in that acetone is used as the medium for sepg. arachidic acid from the sol. acids in place of petroleum ether or EtOH. Solid satd. fatty acids are diffucultly sol., unsatd. acids are easily sol. and esterification cannot take place in acetone. Saponify 20 g. sample in alc. KOH, evap., dissolve the soap in H_2O, liberate the acids with H_2SO_4, warm to melt the acids to form a clear layer on top of soln., collect on a moist filter, dissolve in 150 cc. warm acetone (b. 56-57°) without drying and add H_2O drop by drop until turbidity appears.

If the soln. should become permanently turbid or sep. into 2 layers, add acetone drop by drop until the soln. remains clear at 40-45°. Then allow to cryst. and cool slowly to 15°. After 1 hr. filter off the crystals and wash with 10 cc. dil. acetone (32 H_2O + 68 acetone by vol.). Arachic or lignoceric acids are then detd. according to Tortelli and Ruggeri.

Fachini, S. and Doria, G.

METHOD FOR SEPARATION OF FATTY ACIDS AND THE DETECTION OF ARACHIDIC ACID.

Chem. Ztg., 38, 18; C.A. 8, 1312(1914).

The method depends upon the fact that under proper conditions the K salts of the solid fatty acids are insol. in dil. acetone, while the K salts of the liquid fatty acids are sol. For the detection of peanut oil in olive oil, 10 g. of the mixt. fatty acid, "made in the usual way," are dissolved in 90 cc. of pure acetone at b. temp., and 10 cc. of N KOH added. The soln. is allowed to cool to 35-32°, when the 1st crystals form, and then to 15° for some time. The crystals are filtered with suction, washed with a little pure acetone, decomposed with acid, dissolved in petrol.-ether, washed free from mineral acid, and the mol. wt. and m.p. detd. Arachidic acid is detd. in the usual way by crystg. from 90% EtOH.

Fachini, S. and Doria, G.

DETECTION OF PEANUT OIL IN OLIVE OIL.

Ind. olii grassi 6, 50-1(1926); C.A. 21, 506(1927).

The milkiness or ppt. produced by acetone with the fatty acids of peanut oil permits a rapid and sure identification. When peanut oil is mixed with olive oil, 20-30 g. of the latter are sapond. with an aq. soln. of KOH, liberating the fatty acids; these are washed until free from mineral acid and filtered through a dry filter in an oven. Five g. of the fatty acids are dissolved in 50 cc. of acetone at 56-57° in a 150-cc. flask which is closed with a cork contg. a thermometer, and they are left until a temp. of 20° has been reached. Ten cc. of 0.1 N KOH in water is added; the temp. is kept unchanged. If up to 5% of peanut oil is present a milkiness or ppt. is formed. Very acid or old olive oils give a flaky ppt. The free fatty acids are then liberated by neutralization, filtration and washing, and in order to det. the quantity of arachidic and lignoceric acids, the ppt. obtained with acetone is collected, washed with a little anhydrous acetone, dissolved in a little warm water, and the alkali is titrated with 0.1 N H_2SO_4 in the presence of methyl orange, a neutral ether-alc. mixt. is added and the free fatty acids are titrated with 0.1 N alkali with phenolphthalein. From the quantity of arachidic and lignoceric acid and av. neutralization no. of these acids, the quantity of peanut oil in the olive oil is calcd. A gravimetric detn. is conducted by liberating the fatty acids with dil. mineral acid in a separatory funnel, treating with ether, eliminating the solvent and weighing the mixt. of arachis and lignoceric acids.

Falcone, A.

ANALYSIS OF EDIBLE OILS.

Ann. chim. applicata 18, 273-80(1928); C.A. 22, 4000(1928).

The increasing adulteration of olive oil with other vegetable oils induced F. to undertake a systematic series of expts. to ascertain whether these oils can be identified by simple tests. To olive oil was added in various proportions (10, 20, 30, 40, 50 and 60%) peanut, sesame, rape seed, colza, soybean, cottonseed, corn, grape seed and poppy seed oils and the d., thermal const. with H_2SO_4 (Tortelli) and n value were detd. for each mixt. The results are tabulated in complete detail, and show that it is possible to identify the presence of any of these oils in olive oils by detg. the 3 consts. mentioned, i.e., the 3 consts. of each mixt. of olive oil and the other oil when considered together are characteristic enough to allow the oil to be distinguished from other combinations.

Gilmour, George van B.

A NEW METHOD FOR DETECTING ADULTERATION IN BUTTER AND FOR ESTIMATING FATS OF THE COCONUT GROUP.

Analyst 45, 2-7(1920); C.A. 14, 1166(1920).

The volatile acids are distd. and detd. by titration. To the neutral soap is added a vol. of H_2SO_4 equiv. to the amt. of 0.1 N NaOH needed for neutralization of the acids. Then neutral, dry NaCl is added to sat. the soln. After filtering, the filtrate is titrated to give the number of cc. 0.1 N NaOH needed to neutralize the sol. volatile acids. The number representing the amt. of insol. volatile acids is obtained by difference. Tables are included giving the numbers for butter, coconut, and palm kernel fats and arachis oil and mixts. of these, and also formulas to detect the amt. of the addition of these fats to butter.

Grossfeld, J.

ESTIMATION OF INDIVIDUAL FATTY ACIDS IN EDIBLE FATS.

Apoth Ztg. 44, 1387-91, 1403-6(1929); C.A. 24, 742(1930).

In the detection and estn. of individual fatty acids and their resp. groups, certain methods, developed in part by G., are discussed, and the procedures outlined. Of special importance are: (1) Sepn. of solid from liquid fatty acids through crystn. of their Pb salts from alc. (2) Sepn. of the satd. from the unsatd. fatty acids via Bertram. (3) Estn. of individual satd. fatty acids or groups through (a) detn. of the butyric acid no., detection and estn. of butter fat; (b) detn. of the capyrlic acid no., detection and extn. of coconut fat; (c) detection of lauric acid and calcn. of the lauric acid no., detection and estn. of coconut and palm kernel fat; (d) detection and estn. of high-mol. acids as stearic, especially in peanut and hardened fats. (4) Estn. of individual unsatd. fatty acids and their resp. groups; (a) oleic and linoleic acids in admixt. via Kaufmann; (b) isooleic acid for the recognition of hardened fats via Twitchell; (c) erucic acid for the recognition of the mustard oils; (d) linolenic acid for the recognition of certain drying oils; (e) fatty acids with more than 3 double bonds.

Grossfeld, J.

DETERMINATION OF THE MOLECULAR WEIGHTS OF THE HIGHER FATTY ACIDS AND ITS USE FOR THE DETERMINATION OF LIGNOCERIC ACID IN HARDENED PEANUT OIL MIXTURES.

Z. Untersuch. Lebensm. 58, 209-61(1929); C. A. 24, 3390 (1930).

In spite of the great variation in the amts. of satd. and unsatd. acids in peanut oil, the ratio of lignoceric to arachidic acid is approx. const. and has the av. value 44.1:55.9. Heiduschka and Felser's titration method for arachidic acid (C. A. 16, 3767) fails in the presence of hardened fats, since the excess of stearic acid produces a ppt. in the presence of alc. KOH soln., and the K salts prepd. by their method are contaminated with free fatty acids. The sources of error in the detn. of lignoceric acid by sepn. of the slightly sol. fatty-acid fraction and calcn. from the mean mol. wt. are discussed and it is considered preferable to obtain the mol. wt. from the K content of the neutral K salt. This is prepd. by sapon. of 10 g. of fat with 10 cc. of 95% alc. and 4 cc. of 50% KOH soln. heated under a reflux condenser, sufficient stearic acid being added to make the total quantity present at least 1.5 g. The hot soln. is shaken with 150 cc. of 95% alc., 4 cc. of 96% AcOH and 30 cc. of a 1.5% soln. of $Pb(OAc)_2$ in alc. and AcOH, and after 1 1/2 hrs. the cold soln. is filtered, and the residue dissolved in 200 cc. of hot alc. and AcOH. The soln. is concd. to 20 cc., boiled with 100 cc. of hot H_2O, 5 cc. of dil. HNO_3 and the layer of fatty acids removed and saponf. with 1 cc. of 50% KOH soln. (Kreis and Roth, C. A. 7, 1559). The acids are then reppt'd. from the dild. soap soln. with 2 cc. of 25% HCl, washed, neutralized by titration of a filtered soln. in neutral 95% alc. with 0.5 N alc. KOH till a weak red color is obtained in the presence of phenolphthalein. This is just removed by a few drops of a 0.5% soln. of stearic acid in alc. and the soln. warmed with 50 cc. of neutral ether and cooled. Fine crystals in the cold soln. indicate a small quantity of stearic acid, while a gelatinous ppt. denotes a large amt. After 2 hrs., 150 cc. of ether is added, and the next day the neutral K salt is filtered off, washed and dried in air below 60° till const. wt. Since incineration gives low results, the K is detd. as perchlorate by addn. of 12 cc. of $CHCl_3$ (to inhibit pptn. of the fatty acids) 0.5 cc. of AcOH and 2.4 cc. of 20% $HClO_4$ to a soln. of the K salt in 20 cc. of 96% alc. The $KClO_4$ is filtered off the next day, washed, dried and weighed and, if a correction of 0.14 mg. per cc. is added to the results, an accuracy of 0.5 mg. is obtainable. Then if k is the $KClO_4$ value (% of $KClO_4$ obtained from the K salt), the mean mol. wt. is $13,856/k-38.09$. The lignoceric acid content of the sample may then be found from the formula $16.63\ (39.54-k)$ for k - 34.00 to 37.16 (absence of stearic acid), or $6.81\ (42.98 - k)$ for k - 37.16 to 42.98 (presence of stearic acid). Tables and graphs are provided to assist in these calcns. The method is applied to the detection and detn. of hardened peanut oil in cacao butter, and to the detn. of stearic acid in the presence of palmitic acid. High values of k are obtained if KOH contg. carbonate is used, and it is advisable to standardize the method in the presence of

pure stearic acid when ± 0.04% of lignoceric acid, corresponding with 2-4% of peanut oil, may be detd. Six samples of hardened peanut oil offered as cacao butter contained 1.2-1.6% of this acid, and these low figures, compared with the normal value of 2.5-3%, are due probably to the presence of other fats. In lard, beef fat, butter fat, hazel nut, walnut, almond and apricot oils, illipe butter and karite fat, stearic acid was found to be the fatty acid of highest mol. wt. Behenic acid in hardened train oil may be detd. by the same method from the formula 14.99(42.98 - k); 2 samples contained 4.46 and 4.65%.

Grossfeld, J. and Miermeister, ...

DETECTION OF COCONUT AND PALM-KERNEL OILS BY THE LAURIC ACID TEST.

Z. Untersuch Lebensm. 56, 423-37 (1928); C.A. 23, 2512 (1929); cf. C. A. 23, 914.

From 1 to 100 mg. of the fat is saponf. in a test tube with 2.5 cc. of alc. 0.5 N KOH and evapd. The residue, dissolved in 2 cc. of H_2O, is mixed with 2 cc. of glycerol (300 g. per l.), placed for 5 mins. in a boiling water bath and ppt. with 2 cc. of $MgSO_4$ (150 g. per l.). After filtering while hot through a thick filter, and refiltering the first portion of the filtrate a clear filtrate, indicates no lauric acid is present; a turbidity indicates 10% or more of lauric acid (20% coconut oil) while a heavy white ppt. is proof of the presence of a large quantity of coconut or palm-kernel oil. By increasing the quantity of the sample, and using certain refinements, as little as 0.5% of lauric acid (1% coconut oil) may be detected. Lauric acid in small quantities was found in butter, hardened peanut and cotton-seed oils. Cacao, soy bean and blubber oils gave neg. tests for lauric acid.

Grossfeld, J. and Simmer A.

SEPARATION AND DETERMINATION OF SOLID FATTY ACIDS IN EDIBLE FATS. Z. Untersuch. Lebensm. 59, 237-58 (1930); C. A. 24, 5174 (1930).

The sample consisting of 2-1/2 g. of fat is saponified at the b. p. for 10 min. under a reflux condenser with 1 cc. of 50% KOH soln. and 25 cc. of 95% alc. The boiling is continued after addn. of 100 cc. of a soln. contg. 50 g. of $Pb(OAc)_2$ and 5 cc. of 96% AcOH until the ppt. has completely dissolved; 20 cc. of boiling H_2O is added and the mixt. is allowed to cool slowly overnight to 22°. The filtered ppt. is washed with 50 cc. of 70% alc. (by vol.) and extd. with 3 cc. of 96% AcOH and 100 cc. of the hot $Pb(OAc)_2$ soln. The hot soln. is shaken with 15 cc. of hot H_2O, and the pure Pb salts of the solid fatty acids are sepd. by filtration on the following day, washed with alc. as before, dissolved in 5 cc. of 96% AcOH and 25 cc. of warm 90% alc., and 5 cc. of dil. HNO_3 (sp. gr. 1.2) is added. Warm water is carefully added and the acids are sepd. by heating at 98° until they form a clear layer on the surface; they are then filtered from the cooled soln., washed until neutral and dried first in air and finally in an oven. The I value is detd. by back titration with a 0.1 N $Na_2S_2O_3$ (1 cc. is equiv. to 14.12 mg. or 0.5646% of isooleic acid), with starch as indicator, 15 min. after the addn. of 15 cc. of 10% KI soln. and 25 cc. of Hanus I soln. The method gives higher results than that of Twitchell. With hardened peanut, cotton-seed and marine and animal oils 13.3 to 33.8% of isooleic acid was found, but the results may be low because of the varying solubilities of the Pb salts in alc. Bertram's vaccenic acid (C. A. 23, 373), an acid of the isooleic type, was found in beef fat 0.76-1.61%; butter fat 1.13-4.69%; mutton fat 0.99-1.84%; margarine fat 1.49 and lard 0.20%. Rape oil had an erucic acid content of 50.9% and addns. of 5-10% of rape oil to linseed, peanut or sesame oils were detectable by the above method. Other applications of the test are discussed.

Guarnieri, F.

THE DETECTION AND DETERMINATION OF PEANUT OIL IN AN OIL MIXTURE.

Staz. sperl. agr. ital., 42, 408-14(1909); through Chem. Zentr., 1909, II, 1278-9; C. A. 5, 1201 (1911).

The author recommends a method which depends on the sepn. of the fatty acids of lead salt. The following reagents are necessary: (1) Glycerol-KOH soln. consisting of 20 cc. of 50% KOH heated with 110 g. glycerol until all water is evapd., (2) glycerol-Pb soln. consisting of 50 g. neutral Pb dissolved in 110 g. glycerol, (3) 90% alc., d_{15}, 0.83415, (4) 90% alc. containing in 1 l. at 15° 1 g. fatty acid of peanut oil. Saponify for 3-4 min. 5 g. oil with 10-11 cc. soln. (1) in a porcelain dish over free flame. Add 15 cc. soln. and heat again. Cool, add 200 cc. water at 70-80° and cause the soap to adhere to the sides of the dish. Repeat washing with water twice more. The water is then removed as much as possible, the soap treated with 50 cc. Et_2O and gently heated on water bath. Transfer insol. residue to a separatory funnel, add 50 cc. 20% HCl and 150 cc. Et_2O and shake thoroughly. Wash the Et_2O soln. with water until free of acid, distil the Et_2O in stream of CO_2; to the residue add 20 cc. fatty acid alc., heat gently on water bath and transfer soln. to a large test tube. On cooling, mother-of-pearl flakes of arachidic acid crystallize out.

Güth, H.

EDIBLE OILS.

Pharm. Zentr., 49, 999-1003; through Chem. Zentr., 1909, I, 206; C. A. 3, 2594 (1909).

After examining several pure commercial oils the author concluded that: (1) If Baudoin's or Halphen's reaction is distinct when examining olive or poppy oil, sesame oil is present. The slight coloration noticed with pure olive oil is not worthy of consideration, representing only such minute quantities of sesame oil (1%) as would not be profitable as adulteration. (2) A positive Halphen's reaction in vegetable oils proves the presence of cottonseed oil. (3) Poppy or peanut oil is present in olive oil if Bellieu's reaction is positive and Baudoin's is negative. (4) If more than 10% of poppy oil is present it may be detected by determining the I no. The isolation of arachidic acid will prove the presence of like amounts of peanut oil. (5) Rape oil will lower the sapon. no. and linseed oil will raise the I no., only however, in the absence of unsaponifiable mineral oils.

Haitinger, Max.

FLUORESCENCE-ANALYSIS FROM THE STANDPOINT OF TESTING MATERIALS ESPECIALLY IN REGARD TO FOODS AND CONDIMENTS, ETC.
Mitt. staatl. tech. Versuchsamtes(Wien) 17, Nos. 1,2,3, 147-56 (1928) C. A. 23, 3028 (1929)

Whole milk fluoresces a canary-yellow, but upon standing, this color centers in the cream and the rest of the milk finally ceases to fluoresce, becoming white. Normal skimmed milk likewise fluoresces yellow so that no analytical application is made. Filter paper and cotton take up this yellow fluorescence; very quickly the color is diluted and the adsorbent becomes white after a time. Salicylic acid (as an example of a preservative) in heated milk (0.5 g./l.) shows blue on filter paper. Dried milk fluoresces lighter than fresh milk; whole milk powder cannot be differentiated from skimmed milk powder. Butter fluoresces like milk; artificial fats, in masses, show white or yellow mostly with a blue luster and often a direct blue. In thin layers such fats are blue entirely. Different fat solvents yield different fluorescence. Eggs and albumin from fresh eggs, when raw, show nil, but upon heating, a canary-yellow fluorescence is obtained. Old egg albumin yields a blue. The shells of eggs are rose to dark red under the quartz lamp. Other colors given are: French olive oil, bluish white; Dalmatian olive oil, weak rose; Italian olive oil, silver-gray; technical olive oil, red to rose-yellow; sesame oil, lustrous lilac; soybean oil, light lilac; peanut oil, light gray; castor oil (first press), light blue and (second press), yellow; refined oils, lilac; technical refined or extd. oils, yellow; raw oils, dark with a faint blue. Mineral oils cannot be confused with such oils, as mineral oils give other characteristic reactions. A large number of other food substances are listed and described with fluor-analytic possibilities.

Hinard, Gustave and Boury, Maurice.

THE IDENTIFICATION OF FILLING OIL AND OF COOKING OIL IN CANNED FISH.

Ann. falsi. 26, 134-43(1933); C. A. 27, 3353 (1933).

In France the only oils used to date in the canning of fish are peanut and olive oils; and in practice the problem resolves itself to the identification of peanut oil, either alone or in admixt. with olive oil, but is complicated by the presence of the fish oil (contg. a certain amt. of cooking oil) which diffuses into the filling oil. The Bellier no. of olive oil varies from 12° to 14° (up to 16° for certain Algerian, Tunisian, Spanish and Portuguese oils); for sardine oils it varies within a narrow range about 19°, tunny oil around 21° and peanut oil around 40°. The oil of canned fish, after standing sufficiently long for complete interdiffusion of the fish and filling oils, may contain up to about 25% of oil derived from the cooked fish, which in turn may contain up to about 20% of the cooking oil. If the oil taken from the tins has a Bellier no. of 16° or less, pure olive oil was used for both cooking and filling; a Bellier of 16-18° generally indicates cooking with peanut and filling with pure olive oil; a Bellier of 18-20° points suspiciously to filling with an olive oil adulterated with peanut oil; a Bellier above 20° clearly indicates adulteration of the olive oil. In suspicious cases, adulteration can sometimes be proved if a sample of the olive oil used is available as a control. The technic used for making the Bellier test is described.

Hockman, Chas. A.

EXAMINATION OF OLIVE OIL FOR THE PRESENCE OF ARACHIS OIL.

Chem. Druggist 76, 329-30; C. A. 4, 2976 (1910)

In the opinion of the author no definite decision should be given in a doubtful case of adulteration without testing for arachidic acid. The minute details of the "Archbutt-Renard" method of detecting this acid are given.

Jaffe, E., Reale Ist. Com. Gabinetto di Merceologia, Genova.
NEW METHOD OF RESEARCH AND THE DETERMINATION OF PEANUT OIL IN OLIVE OIL.
Ann. chim. applicata 18, 368-86 (1928); C. A. 23, 1003 (1929).

The new method for detecting the presence of peanut oil in olive oil depends upon the different solubilities of the Li salts of fatty acids in EtOH. Data in the literature (cf. Arch. Pharm. 1903, 552; Z. angew. Chem. 1904, 482; Z. Unters. Nahr-u. Genuss. 1904, 129) were confirmed and amplified by further expts. of J., which show that the Li soaps of pure peanut oil and of mixts. of this oil with olive oil ppt. from their alc. solns. at higher temps. than the Li soaps of pure olive oil, this temp. differential being directly proportional to the quantity of peanut oil present. The fatty acids obtained by decompn. of the Li soaps sepg. at 17-18° ppt. from 90% EtOH only if arachic acid is present, and this temp. of pptn. is proportional to the quantity of peanut oil in the olive oil. From the solid fatty acids sepd. from 90% EtOH can be obtained a crude arachic acid, which m. 72.5-73°. Though the method does not permit the quant. sepn. of crude arachic acid, it is sufficiently precise for industrial analysis, for the lowest proportions of peanut oil ordinarily used for adulteration, e.g., 5%, can be identified as reliably as by the Tortelli-Ruggeri method, considered to be the most precise. The new method offers the advantage of greater ease of manipulation and great rapidity, the procedure requiring not over 2 hrs. Procedure. - Add 50 cc. of KOH soln. (90 g. KOH, 62 cc. water, 1000 cc. 95% EtOH) to 10 cc. of oil, reflux until completely saponf., neutralize with 12% aq. AcOH (phenolphthalein), bring to boiling, add 100 cc. of 15% alc. LiCl (in 70% EtOH), put into a water bath at 15-16° and observe the temp. at which crystals first sep. Then cool to 17-18°, filter (suction) wash with 70% EtOH (5 portions of 10 cc. each) Transfer the ppt. to a separatory funnel, decomp. the soaps with 50 cc. of HCl (d. 1.10), cooling to aid the sepn of fatty acids, at 25-30° and 50 cc. of C_6H_6 or petr. ether, agitate violently, sep. the aq. layer, wash with 30 cc. of HCl and then repeatedly with water (50 cc. each time) until neutral, filter the fatty acids, distil off the remaining solvent, add 30 cc. of 90% EtOH and 2 drops of 0.5 N HCl, heat to 60° until a clear soln. is obtained, and cool, observing the sepn. With pure olive oil, the soln. remains practically clear down to 12°. With oil contg. 5% peanut oil, minute crystals appear at 15-16°, the whole liquid becomes turbid and after 0.5 hr. there is considerable deposition. With pure olive oil the liquid is still clear even after 1 month at 15-16°. To confirm the presence of arachic acid, add 10 cc. of 90% EtOH, dissolve by heating, and cool again. In this case after some hrs. at 13-14° only minute white crystals sep., leaving a clear supernatant liquid. For further confirmation, keep the mixt. for 2 hrs. at 15-16°, filter, wash 3 times with 10 cc. of 90% EtOH, then repeatedly with 70% EtOH, dissolve the residue in boiling 90% EtOH (10-30 cc.), allow to crystallize again, filter, wash as before and dry at 100°. The m.p. should be 72.5-73°. The following data give the % peanut oil added to pure olive oil and the corresponding temp. of pptn. of the Li salts of

the fatty acids and the temp. of crystn. of crude arachic acid from 90% EtOH, resp. 0, 24-6°,-; 5,25-6°, 15-16°; 10, 26-8°, 17-18°; 20, 29-31°; 21-2°; 30, 32-4°, 25-7°; 40, 36-5°, 29-31°; 50, 41-3°, 33-5°; pure peanut oil, 56-7, 40-3°.

Jamieson, G. S.

REPORT ON FATS AND OILS. (DETERMINATION OF PEANUT OIL IN ADMIXTURE WITH OTHER OILS AND DETERMINATION OF ACETYL VALUE OF OILS.)
J. Assoc. Official Agr. Chem. 10, 333-8(1927); cf. C. A. 20, 3245; C.A. 21, 3474(1927)

Collaborative study of the Thomas and Yu method (C.A. 17, 645) for the detn. of peanut oil in admixt. with olive oil showed that the method allows the entrainment of some lower-melting satd. acids along with the arachidic and lignoceric acids, causing high results. Considerable improvement in agreement between the results of different collaborators in the detn. of the Ac no. by the André-Cook method (Andre, C.A. 15, 2556; Cook, C.A. 16, 1674) was obtained by closely specifying the procedure of washing to remove excess Ac_2O, and the method is recommended for adoption as official.

Jamieson, G. S.

Bur. of Chemistry and Soils, Washington, D. C.
REPORT ON (THE ANALYSIS OF) FATS AND OILS.
J. Assoc. Official Agr. Chem. 11, 301-8(1928); C.A. 22, 4000 (1928); cf. C.A. 21, 3474.

Collaborative results showed that both the Thomas-Yu method (C.A. 17, 645) and Evers' modification (C.A. 7, 662 of Bellier's method (Ann. chim. anal. 4, 4(1899) give high results, and that neither of them, as now formulated, gives satisfactory results in mixts. contg. 15% or more of peanut oil. Collaborative results on the detn. of satd. and unsatd. fatty acids in corn oil, cottonseed oil and peanut oil by the Pb-salt-Et_2O method and by the Pb-salt-alc. (Twitchell) method showed fairly good agreement, especially in view of the difficult technics involved. Though the Twitchell method is supposed to give a satd. acid fraction contg. so little unsatd. acids as to require no correction, it was found that the satd. acids sepd. frequently had an I no. of 4 or more.

Jansen, J. D. and Schut, W.

DETERMINATION OF MIXTURES OF TWO AND OF THREE OILS BY MEANS OF SEPARATION TEMPERATURES.

Chem. Weekblad 23, 498-502(1926); C. A. 21, 829 (1927).

Meerburg (Verslag Centraal Laboratorium 1914; cf. C. A. 9, 2156) gave a method for the detn. of linseed oil in rape oil (also for liquid paraffin in rape oil) based on the detn. of the critical temp. at which 2 liquid phases are formed in a mixt. of the adulterated oil with aniline. The critical sepn. temp. for pure rape oil and aniline was 37.6° with an aniline content of 80%. The author extended this work to several other oils. The critical temp. of sepn. (a rather flat max.) appeared to be situated for all oils at about 80% aniline, and was for rape oil 37.5°, for peanut oil 26°, for olive oil 26°, for cottonseed oil 19°, for sesame oil 18°, for soy bean oil 10°, for linseed oil 6°. It was found that linear interpolation between 2 critical temps. is allowed to find the sepn. temp. of any mixt. of 2 oil compounds with aniline. The error in percentage may be around 5%. Linear interpolation also holds for a mixt. of 3 oils. Efforts were made to find a second liquid besides aniline suitable for the detn. of sepn. temps. in order to be able to analyze ternary mixts. From a triangular diagram it is shown how the compn. can be found. Anhyd. acetone (60% for the sepn. point) gives good sepn. temps., but all of them are about 18° lower than those with aniline; for this reason it is useless. Of several other liquids is-butyl alc. (also Pr alc.) gave sepn. temps. with the same oils as mentioned above of 16.5°, 5.0°, 2°, 2°, 5°, 4°, 5°, resp. The accuracy for ternary analysis is, however, very small. It may be better to use some other property, I no., sp. gr., for further differentiation.

Jean, Ferdinand

ESTIMATION OF EARTH-NUT OIL IN ADMIXTURE WITH OTHER OILS.

Chem. Centr., 1898, ii, 585; from Ann. Chim. Anal. Applic., 3, 220-221; B.A. 1899, ii 260.

Ten grams of the sample to be tested for earth-nut oil is heated to 110°, 3 grams of potassium hydroxide dissolved in spirits of wine added, and the whole well stirred. The soap is then boiled in a reflux apparatus with 100 c.c. of 36 per cent alcohol, previously saturated at 15° with potassium arachidate, until the mass is entirely dissolved. After being kept for 12 hours at 15°, the alcohol is drained off and the residue treated as before with 100 c.c. of the same alcohol. After removing the liquid portion, the solid soap is dissolved in 50 c.c. of hot water containing a little hydrochloric acid, and the liberated arachidic acid dissolved in light petroleum and recovered by evaporation. Its melting point should be 71-72°; 5.5 parts of arachidic acid represent 100 parts of earth-nut oil.

Jong, D. J. de, Utrecht.

DETECTION OF PEANUT OIL IN OILS AND FATS.

Pharm. Weekblad 54, 1390-8(1917); C.A. 12, 536 (1918).

Three common methods of detecting peanut oil in com. oils and fats are compared: (A) Jean's method, prescribed in the Dutch Pharm. for olive and sesame oils; (B) the Franz-Adler method, given in the Codex Alimentarius 2, 69 (Ed.2); (C) the solidification point method. In A the oil is saponified with alc. KOH and kept at 18°; with 10% or more peanut oil, a ppt. appears within 1 hr., with pure oil not for 2 or more days. In B the oil is saponified with alk. KOH and acidified with dil. HCl, and the temp. at which crystn. of arachidic acid begins is detd. With some practice the detn. can be made accurate to 0.5°. The Codex offers this as a general method; but it is not so, since the temp., for a given content of peanut oil, must first be detd. for every individual oil. The same is true of A, but by change, when 2 cc. of olive or 1 cc. of sesame are treated, the temp. and time are approx. the same. For rapidity and accuracy, B is the best; C is not nearly sensitive enough, since large increases of peanut oil content have but little effect on the solidification point. The Renard-Archbutt method, given by the Codex (loc. cit.) for a decisive method in legal cases, is also not sensitive enough; 10% of peanut oil can barely be detected by this means. It is similar in principle to B, but uses the Pb soap instead of the K soap.

Kerr, R. H.

IMPROVED METHOD FOR THE DETECTION OF ARACHIDIC ACID.

J. Ind. Eng. Chem. 8, 904(1916); C.A. 10, 2990 (1916).

Twenty g. of oil are saponified with alc. KOH, excess KOH is neutralized with alc. AcOH, 50 cc. alc. $(AcO)_2Pb$ are added and the soln. boiled and allowed to remain 1 day at 10 to 15°; it is then filtered and the ppt. washed. Dil. H_2SO_4 is used to decompose the Pb salts and the sepd. acids are dissolved in alc. and the arachidic acid crystd. out.

Kofler, L. and Schaper, E.

A MICRO PHYTOSTEROL ACETATE TEST.

Fettchem. Umschau 42, 21-6(1935); C. A. 29, 3865 (1935).

A micro method, based on the Wizoff macro method (cf. Einheitliche Untersuchungsmethode fur die Fett- und Wachsindustrie. 2nd Ed. Stuttgart 1930), for qualitatively sepg. the sterols in fats as their acetates is described in detail. The m. ps. of prepns. so obtained were studied by means of the app. described in C. A. 25, 1121; 29, 2 . A detailed description of the phenomena observed with pure phytosterol acetate (I) (prepd. from material believed identical with the sitosterol of Windaus and Brunken, C. A. 19, 303) and various mixts. of I and cholesterol acetate during crystns. from alc., melting and recrystns. on cooling reveals the complexity of the observed changes. Thus, e. g., I appears to exist in two solid and one liquid-crystal modification. However, in carrying out a practical phytosterol acetate test it suffices merely to det. the m. p. of the crystals which melt. last. A graph of the so-defined m. ps. of mixts. of I and cholesterol acetate plotted as a function of their compn. shows that a max. m.p. was observed with 50% (cf. C. A. 22, 692) and a min. with 90% I. On similarly plotting the m. p. of sterol acetates obtained from mixts. of lard and sunflower-seed oil, a max. m. p. was found with 25% and a min. with 75% of the latter, this displacement of both the max. and min. being probably due to a higher sterol content of the vegetable oil. The shape of the curve indicates that addns. of small amts. of sunflower-seed oil to animal fat cause a disproportionately large increase in the m.p. of the mixed sterol acetates obtained from the fat mixt. Tests with the new method, which requires less time and smaller amt. of reagents and sample, demonstrated its reliability for detecting the presence of relatively small amts. of vegetable oils mixed with animal fat: e.g., 2% peanut oil added to lard could be readily detected. Difficulty was experienced in detecting addns. of coconut oil to lard, owing to the low sterol content of the former.

Kreis, Hans

DETECTION OF EARTH-NUT OIL.

Chem. Zeit., 19, 1895, 451--452; B. A. 1895; 540.

The author recommends the following modification of Renard's process:--The fatty acids from 20 grams of the sample are dissolved in 300 cc. of ether, and slowly mixed with 150 cc. of alcohol containing 15 grams of lead acetate; the lead oleate remains almost entirely in solution, and the deposit consists of the lead salts of the solid fatty acids. After washing these with ether, they are boiled with 250 cc. of 5 percent hydrochloric acid, until the fatty acids have quite melted, washed a few times with boiling water, to remove the lead chloride, and, after cooling, the cake is dried between blotting paper, and dissolved in 100 cc. of 90 percent alcohol with the aid of a gentle heat. On cooling, any arachidic acid will slowly crystallize out, and may afterwards be recognized by its melting point (74°). Its weight multiplied by 110 gives the approximate percentage of arachis oil in the sample.

Kreis, Hans and Roth, Emil

HARDENED OILS AND THE RECOGNITION OF ARACHIDIC ACID.

Z. Nahr. Genussm., 25, 81-5; C. A. 7, 1559 (1913).

A study of the qual. reactions of hardened oils and especially a study of the detection and estn. of arachidic acid. The following method for the detn. of arachis oil in hardened oils is recommended: Saponify 20 g. of oil with 40 cc. alc. KOH. Add 60 cc. alc. and acidify with 50% AcOH (about 15 cc.). Ppt. at the b. temp. with 1.5 g. $(AcO)_2Pb$ dissolved in 50-100 cc. alc. Let stand over night and decompose the sepd. Pb salts by b. with 5% HCl. The mass of fatty acids amounts in all cases to about 2 g. Dissolve in 50 cc. 90% alc. by aid of gentle heat and place in H_2O at 15° for 30 min. Filter off any crystals by use of suction and recrystallize first from 25 cc. then from 12.5 cc. 90% alc. In the presence of at least 5% peanut oil the m. p. of the 3 times crystallized substance is above 70°.

Kroeber, L.

OLEUM OLIVARIUM AND OLEUM ARACHIDIS, GERMAN PHARMACOPEIA V.

Apoth. Ztg., 27, 278-9; Chem. Zentr., 1912, I, 1732; C. A. 7, 2658 (1913).

Climatic conditions play an important rôle in detg. the acidity of olive oil. The Bandouin test for detecting sesame oil in arachis oil is too delicate, since the color change occurs when there is as little as 1/4-1/2% present, which cannot be avoided industrially. The Soltsien tin chloride test which is not given when less than 1% of sesame oil is present is therefore preferable.

Lepierre, Charles, and de Carvalho, Abel.

THE BELLIER REACTION AND OLIVE OILS.

Chimie & Industrie Special No., 585-7 (March, 1932); C. A. 26, 3689 (1932).

The Bellier reaction for peanut oil always gave neg. results on Portugese olive oils of known purity from all regions (with the single exception noted below). Spanish oils of the 1930 and 1931 harvests from the Badajoz district and Portuguese oils from the adjoining Alentejo district gave pos. Bellier reactions, which would have indicated the adm. of 5-10% peanut oil. Further investigation of these oils, and of oils prepd. in the lab. from olives from the same regions, showed that the pos. Bellier was due, not to the presence of peanut oil, but to a peculiarity in the compn. of the oils (excess of tripalmitin and tristearin, with traces of arachidin and of lignocerin). Application of other tests for peanut oil did not give better results than the Bellier. The latter is not sp., as a sample of sardine oil prepd. in the lab. gave a turbidity at 29°, and 3 samples of soy-bean oil gave a turbidity at 19.4, 21.4 and 21.5°, resp.

Levallois, A.

CHARACTERISTICS OF OLIVE OIL.

Compt. rend., 104, 371-373; B. A. 1887, 535.

The author has examined a large number of genuine samples of olive oil from the olive yards of the south-east of France. The colour of the oil was determined by means of a Duboscq colorimeter. The colour at the commencement of a crop is 70 times as intense as at the end. The sp. gr. at 15° varies from 0.9167 to 0.9177, and the differences observed with different species are only very slight. The sp. gr. of olive oil at 24° is 0.911, whilst that of other oils at the same temperature is as follows:-

Sesame	0.917	Colza	0.910
Cottonseed	0.9165	Camelina	0.920
Earth-nut	0.912	Linseed	0.928
Poppy	0.9205		

The sp. gr. of colza and earth-nut oil are somewhat near that of olive, but their other properties make it easy to distinguish between them. Cailletet's reagent (nitric acid saturated with nitrogen oxides) usually gives a green coloration, which, however, is not always pure, but is sometimes mixed with yellow. Audoynaud's reaction (addition of nitrosulphuric acid and ether to a mixture of the oil with potassium dichromate) usually gives a green coloration, which in some cases is mixed with yellow. The determination of the non-saturated fatty acids by treating the non-saponified oil with bromine or iodine gave no concordant results. The following method is satisfactory:-5 grams of the oil are weighed into a test-tube about 15 cm. long and 15 mm. diameter, mixed with 10 c.c. of a 20 percent solution of potassium hydroxide in alcohol of 93°, and agitated, when the oil dissolves. The liquid is then heated on a water-bath to a temperature sufficient to produce gentle ebullition, and after about 15 minutes saponification is complete. The volume of the liquid is then made up to 50 c.c. by adding alcohol, and 5 c.c. of the solution is placed in a tube provided with a glass stopper, acidified with hydrochloric acid, and then mixed with a concentrated aqueous solution of bromine from a burette, with vigorous agitation, until the liquid acquires a persistent pale-yellow tint. About 0.1 c.c. of solution is required to produce the end reaction, and this should be subtracted from the total volume added. The bromine is standardised by means of a decinormal solution of arsenious acid, mixed with hydrochloric acid. Different samples of oil from the same species of olive absorbed from 0.512 to 0.522 gram of bromine per gram of oil. The absorption by oil from different species of olive varied from 0.500 to 0.544, the last result being obtained with oil from Blanquetier which also has an exceptionally high sp. gr. The amount of bromine absorbed by 1 gram of other oils is as follows:--

Cottonseed	0.645	Colza	0.640
Sesame	0.695	Camelina	0.817
Earth-nut	0.530	Linseed	1.000
Poppy	0.835		

The alcoholic solution of soap from oil of earth-nut becomes solid as soon as the temperature falls to 15°, but the corresponding solution of olive oil soap remains liquid. The most constant characteristic of olive oil is its sp. gr., but the determination of the bromine absorbed is also very useful.

Lucas, H. J.

THE DETERMINATION OF NITROBENZENE IN PEANUT OIL.
J. Ind. Eng. Chem., 5, 576-7; C. A. 7, 2978 (1913).

Methods for recovering $C_6H_5NO_2$ from fixed oils by means of steam distillation give low results. The $C_6H_5NO_2$ can easily be reduced to $C_6H_5NH_2$ in HCl solns. by the action of powdered Zn, and the aniline thus formed sepd. by means of solvents and finally recovered as $C_6H_5NH_2HCl$ by evapg. to dryness the HCl ext.

Lüers, H., Munchen.

THE FRANZ-ADLER METHOD OF DETERMINING PEANUT OIL IN OLIVE OIL.
Z. Nahr. Genussm., 24, 683-4; C.A. 7, 846 (1913).

Olive oils free from peanut oil but containing high amts. of myristic acid give a ppt. at 16° in the Franz-Adler peanut oil test (C. A., 6, 2656) due to formation of KH myristate. To avoid this, 3 cc. glacial AcOH are added with the dil. acid to the sapon. soln. which keeps the above salt in soln. Too much conc. acid will hinder pptn. of the acids of peanut oil.

Lund, R.

DETERMINATION OF PEANUT OIL IN OLIVE OIL.
Tidskrift Kem. Farm. Terapi. 12, 157-60(1915); C.A. 9, 2676 (1915).

The acids from pure peanut oil crystallize out of the alc. soln. used in the Franz-Adler method (cf. C. A. 6, 2656; 7, 846) at 40-41°. For each successive tenth part of olive oil added to peanut oil the temp. of clouding in the alc. soln. becomes 39.3, 38, 36.6, 35.5, 33.8, 31.5, 29.2, 25.7, 19.8°. If no clouding takes place until after the temp. has dropped to 16° or less the peanut oil in the sample examd. is under 5%.

Lund, R.

PRESENCE OF PEANUT OIL IN OLIVE OIL.
Deut. Perf. Ztg.; Am. Perfumer 12, 89 (1917); C.A. 11, 3348 (1917).

L. recommends Adler's modification of F. Franz's method for the detn. of peanut oil in olive oil, based on the temp. of crystn. of the mixed fatty acids. Saponify 1 cc. oil (reflux) in 100 cc. flask with 5 cc. alc. KOH (80 g. KOH dissolved in 80 cc. H_2O and made up to 1 l. with 90% alc.), cool to about 25°, add 1.5 cc. AcOH (about 30%) and 5 cc. 70% alc. If soln. becomes turbid, as frequently happens when a large amt. of peanut oil is present, heat on a water bath until clear and cool slowly. The temp. of crystn. of the alc. fatty mixt. corresponds to peanut oil as follows: pure olive oil, 13.5°; with 5% peanut oil, 16.9°; with 10%, 19.8°; with 20%, 25.7°; with 30% 29.2°; with 40%, 31.5°; with 50%, 33.8°; with 60%, 35.3°; with 70%, 36.6°; with 80%, 38.0°; with 90%, 39.3°; and pure peanut oil, 40.3°. If pptn. occurs at 16° or lower it may be due to insufficient AcOH; 3 more drops are then added and the test repeated.....

Lüning, O. and Drude, W.

OCCURENCE OF ARACHIDIC ACID IN CACAO FAT.

Z Untersuch. Lebensm.61, 491-4 (1931); C. A. 26, 535 (1932)

A sample of milk chocolate under examn. showed 0.97 g. of arachidic acid from 20 g. of fat. This indicated adulteration with hardened peanut oil. To prove it various samples of cacao butter were tested by Graf's method of fractional pptn. of the Mg salts (Arch. d. Pharm. 226, 843 (1888) with the modification that the Mg salts were dried at 95° till const. wt. instead of in a vacuum desiccator, and the m ps. of the fatty acids were also detd. Contrary to Graf, no arachidic acid could be detected, and the findings of Amberger and Bauch (C. A. 19, 904) and of Morgan and Bowen (C. A. 19, 634) were confirmed that no fatty acids higher than stearic acid are found in cacao fat.

Marcille, R.

BEHAVIOR OF OILS UNDER ULTR -VIOLET LIGHT.
Ann. falsi., 21, 189-97 (1928); C. A. 22, 3910 (1928).

Fresh virgin olive oil when exam. under ultra-violet light through a Wood screen has a light yellow color, sometimes highly opalescent; under the same conditions second-pressing oil has more of an orange color, which can even be brick red with very low-grade oils. On aging of the oil the color becomes either grayish white or lilac, while aged low grade oils exhibit a more or less marked violet-blue fluorescence, which at times may equal that of seed oils. A study of the causes of these phenomena showed that the violet fluorescence of olive oils is accidental and is due to oxidation or to the action of heat, and that it is particularly marked in refined oils obtained either by pressing or by extn. With seed oils the violet fluorescence is natural in some cases, but in most cases results from the treatments they have undergone in the course of extn. or refining. This property cannot therefore be considered as an abs. characteristic of either group of oils. In practice, the use of ultra-violet light can furnish valuable indications for the preliminary examn. of olive oils; but even those having a normal reaction cannot be absolutely considered as pure, nor does an abnormal reaction positively prove adulteration. In the latter case, if chem. analysis gives normal consts. and shows the absence of adulterants, if the acidity is high (over 3 percent) the oil is probably pure but of low grade, while if the acidity is low the oil is probably a pure refined olive oil. But the latter can also have been mixed with oils of high acidity, so that the interpretation of the results then becomes extremely difficult.

Notes translated from original article

----------certain pure olive oils react like oils of seed, whereas in certain olive oils the addition of 20 percent of peanut oil is not always apparent--------.
----------Among the samples that we have had at hand, the oils of peanut, sesame, cottonseed, sunflower, soybean, corn and castor give a considerable blue fluoresence.----------
----------When decorticated peanuts are ground, the paste treated with carbon disulfide, the solution filtered, evaporation in the cold furnishes an oil which reacts vigorously in ultra-violet light.----------
----------Note (1). We have already found several samples of peanut oil and of soybean oil which do not furnish the Bellier reaction.---------

Marcille, R.

THE BELLIER NUMBER. A STUDY OF ITS USE FOR THE DETECTION OF PEANUT OIL IN OLIVE OILS. VARIOUS OTHER APPLICATIONS.
14 me. Congr. chim. ind., Paris, Oct., 1934, 13 pp.; C.A. 29, 6449(1935).

The Bellier no. is the temp. of initial crystn. of the solid acids of a fat or oil in alc. soln., when the soln., when the soln. is progressively cooled with const. agitation. A recommended technic for carrying out the test is described in minute detail: To 1 cc. of well-clarified oil or fat in a 26-27-mm. X 22-cm. test tube add 5 cc. alc. KOH(75 g. per l.), saponify by careful heating, using an air-cooled reflux condenser, cool to 30-5°, add 1.5 cc. of 1:2 AcOH and 50 cc. of 70% alc., close the tube with a rubber stopper carrying a semiprecision thermometer graduated from 0° to 60° or from 0° to 100°, and note the temp . at which the soln. becomes cloudy through crystn. The test may be repeated on the same portion of sample, but in order to obtain concordant results the temp. must be raised each time about 15-20° above the clouding point. The Bellier no. of peanut oil is generally given as 40 ± 1° and that of pure olive oil as 11.8-14.5°. Examn. of a no. of oils of known purity gave values of 9.5-18°, the high values being obtained with Tunisian and Moroccan oils; oils obtained by extn. of press cake gave values of 9-16.5°. For the detection of peanut oil in doubtful cases, mix 9 parts of sample with 1 part of peanut oil(both by wt.) and det. the Bellier no.; with pure olive oil the value will not exceed 20°(except in extremely rare instances). By drawing a curve of the Bellier no. of mixts. of peanut and olive oils, olive oil in peanut oil can also be detected and detd. If a mixt. of 9 prts. of the supernatant oil of canned fish and 1 part peanut oil gives a Bellier no. above 19.5°, the presence of peanut oil canning oil is indicated. As the Bellier no. depends on the solid acids of oils, it might be deduced that its value was proportional to the solid acids content of olive oils, with the proviso that the oils compared contain solid acids of the same type, of which there are 2: acids sepg. as arborescent crystals and giving Pb salts that are completely sol. in warm Et_2O, and acids sepg. as glomerule-shaped crystals giving Pb salts that are only partially sol. in warm Et_2O. Some olive oils contain practically exclusively one or other type of acids, while others contain both. As the solid acids are insol. in 70% alc., it is suggested that they might be sepd. by the technic of the prepn. of the Bellier test followed by cooling overnight at 10-12° and then for 1 hr. at 5°, centrifuging, filtering, and detg. the acids by weighing or acidimetric titration. The quant. compn. of a mixt. of solid acids, the nature of which is known could be obtained by detn. of the Bellier no. and comparing with curves prepd. from the Bellier nos. of known mixts. of the same acids. Oils extd. from olive press cake, when subjected to the Bellier test and then allowed to stand overnight at 20-5°, contain a suspended flocculent ppt. which gradually gathers at the top of the liquid. This test, though possibly not absolutely specific, is very characteristic, and permits detection of the addn. of 5-20%(according to the origin) of such extd. oil to pressed oil.

Marogna, Gaetano

REFINED OILS. IIa. OILS OF THE SECOND REFINING.
Stax. chim. agrar. Sper. Roma Publ. 277, 20 pp(1931); Chem. Zentr. 1932, I, 1591; C. A. 27, 5998 (1933); cf. C. A. 25, 2015.

Refined Sansa oil has, in general, higher d. than pressed olive oil, n_D is usually 63-4°; the Tortelli no. often exceeds 50°. Of the tests for admixt. of peanut oil, that of Blarez and Bellier gives pos. results in spite of the absence of this oil. The I no. and sapon. no. are below the normal values; the content in non-saponifiable material is higher. Tests on the seed oil depending upon the action of strong mineral acid are as a rule pos. In Wood's light, Sansa oil shows a bluish fluorescence, which is also shown by two old samples of pressed oil.

Martinoli, Siro

ANAYLSIS OF A MIXTURE OF OLIVE OIL AND PEANUT OIL.
Pharm. Acta Helv. 2, 15-8, 30-9, 54-9(1927); C.A. 21, 4081 (1927)

(In Italian.)— A detailed exptl. study of the phys. and chem. consts. of a mixt. (the proportion not stated) of freshly expressed peanut oil and of rancid olive oil. The results are tabulated, compared in each case with recorded results of the single oils. (1) The phys. properties generally show increased values compared with the av. values of the components. (2) The chem. properties vary according to acidity, or rancidity: The Reichert no., the abs. I no., acid no., sapon. no. are increased; the Kehner no. and the relative I no. remain the same, while the mol. wt. nos. diminish. (3) Freshly expressed peanut oil seems to contain anhydrides and lactones, on account of which the Ac no. is greatly increased. (4) The Ac no., therefore, cannot be considered a const., much less can it be a measure of the hydroxylated fatty acids, unless one succeeds in breaking down by chem. means the complex of the acetylated fatty acids. (5) On account of (3), a certain relation exists between the Ac no. and the sapon. no.

Mazzaron, A.

THE SULFUR DIOXIDE INDEX IN THE ANALYSIS OF OILS.
Olii minerali, olii grassi, colori vernici 13, No. 1, 9-10(1933); C. A. 27, 4112 (1933)

A study was made of the application of the SO_2 no. for the detection of adulteration of olive oil. To det. the SO_2 index agitate 20 cc. oil and 10 cc. benzene in an Erlenmeyer flask with 5 cc. H_2SO_4, close the flask, connect with a cylinder contg. 0.1 N I and an aspirator, agitate, after the reaction has ceased and the flask is cold increase the aspiration, add 10 cc. of benzene to flask, agitate, and titrate the I with 0.1 N $Na_2S_2O_3$. For olive oil the thermic index is 43.8, the SO_2 index 3.6; sesame oil 72 and 49.8, resp.; arachis oil 54, 12.2; castor oil, 77, 8.3; linseed oil, 124, 164.7; grape-seed oil, 90, 116.7. For olive oil contg. 50% arachis oil, the thermal index is 7.6, SO_2 index 7.9; contg. 25% grape-seed oil, 18.7, 30.1; 50% grape-seed oil, 48.4, 60.2; 25% linseed oil 24.9, 42.1; 50% linseed oil 70.3, 84.2; 75% linseed oil 113.1, 126.2.

Meerburg, P. A.

SYSTEMS WITH SEPARATION CURVES CONSISTING OF MORE THAN ONE PARABOLA. Rec. trav. chim. 48, 953-9(1929); C.A. 23, 5091(1928).

The concn.-temp. curves for alc.-castor oil mixts. were detd. With the addn. of sesame-, cottonseed- or peanut-oil curves are obtained with 2 crit. points.

Milliau, E.

TUNISIAN OLIVE OIL.

(Chem. Centr., 1904, i, 1026-7; from Bull. Direction Agric. et Comm. Tunis, 1903, 493). B.A. 1904, ii, 456.

Bellier and Kreis's colour reactions with a solution of resorcinol in benzene or of phloroglucinol in ether are to be preferred in the case of Tunisian olive oil to Becchi and Baudouin's tests, which give a yellow coloration with the unadulterated oil. The presence of earth nut oil is detected by Bellier's method. A mixture of adulterated or of pure Tunisian oil with an equal volume of glacial acetic acid at 100° form a clear solution, but if colza oil is present the solution on cooling becomes turbid, whilst the pure oil under similar conditions remains clear even at much lower temperatures. The iodine number is determined by Bellier's method, of which details are given in the original. The results obtained by this method are more accurate in the case of solid fats than of oils, the values found in the latter case being generally too high. A method of estimating the iodine number by measuring the rise of temperature with a mixture of 1 gram of oil and 10 cc. of chloroform or acetic acid is also described in the original paper. The presence of hydrocarbons is detected by determining the portion which is not hydrolysed by a concentrated solution of potassium hydroxide. Oils from Sfax and Tunis have been saponified and the fatty acids converted into dihydroxystearic acid by the action of potassium permanganate. In order to determine the acetyl number, the fatty acids were boiled with acetic anhydride, the product hydrolysed by potassium hydroxide, and the acetic acid, obtained by adding sulphuric acid and distilling in steam, was estimated by titration. By this method, the simultaneous formation of fatty anhydrides is avoided. Sfax olive oil has an acetyl number 262, the Tunis oil 203, and pure ricinus oil 153.

Morosov, N.I.

SOME EXPERIMENTS ON APPLYING PHYSICOCHEMICAL METHOD TO THE INVESTIGATION OF MANCHURIAN BEAN OIL.

J. Trans. Russian Chinese Polytech. Inst. Harbin, No. 4, 121-33 (1925); C.A. 20, 999 (1926).

The methods for the detection of Manchurian bean oil added as an adulterant to other vegetable oils is discussed. The properties of the bean oil approximate closely those of maize oil and sunflower oil. Detection of the presence of bean oil in adulteration of these oils is difficult especially when present in small quantities. Color reactions, such as those of Settimi and Newhall, have been proposed but are not always of value. The property of several vegetable oils to produce emulsions under described conditions was investigated. Five cc. of an oil is mixed with 2 cc. of $CHCl_3$ and then 3 cc. of a 5% soln. of Cu sulfate or Co nitrate is added. When the mixt. is shaken well for 1 min., an emulsion is produced the stability of which depends upon the kind of oil. Bean, sunflower, crude hempseed, peanut and cedar oils have been thus investigated. Bean oil gives a very stable emulsion, while the others very soon divide into 2 unmiscible layers. With some specimens of bean oil a flocculent ppt. is formed. Mixts. of crude hempseed oil with 10, 20, 30, 40 and 50% of crude bean oil have been prepd. and treated as above. The presence of the bean oil may be detected by the flocculent ppt. formed on the interface between 2 layers while pure hempseed oil produces either a very slight or no ppt. By this method 10% of bean oil added to hempseed oil is easily detected.

Müntz, Paulmyer and Rivals.

DETECTION OF PEANUT OIL IN COPRA OIL

Mon. sci., 22, 785-9; C.A. 3, 1820 (1909).

Five samples of copra oil of known purity but from widely different sources were compared with a sample A to which 10% of peanut oil has been purposely added and with an unknown, suspected sample B. The Perrier no. (no. of cc. of N NaOH to neutralize 5 g. of mixed insol. fatty acids) was 23.90-24.10 for the pure oils, 23.37 for Sample A and 23.43 for Sample B. I no. of pure oils, 7.96-8.11; of B, 14.64. I no. of 0.94 of fatty acids, for pure oils, 7.75-8.58; for A, 15.50-15.76; for B, 14.57-15.20. Titer of fatty acids, pure oils, 23.3-24.1°; for A, 21.9°; for B, 22.4°. The point at which a sol. of 5 g. mixed fatty acids in 10 g. of 82% AcOH become turbid when cooled after heating was 32.6-34.7° for pure copra, 90° for pure peanut oil, 40° for A and 38° for B. In addition to these tests, a final criterion was the isolation of arachidic acid, m. 73°, from both A and B; and the conclusion was that the suspected sample contained about 8% peanut oil.

Müntz, Paulmyer and Rivals.

THE DETECTION OF PEANUT OIL IN COCONUT OIL

Corps gras industriels, 35, 178-9; through Chem. Zentr., 1909, I, 1117-8; C. A. 4, 2052 (1910)

The authors' test is based on the slight solubility of arachidic acid in 70% alcohol below 20°. An addition of 10% of peanut oil to coconut oil produces a turbidity. Another test is carried out as follows: 100 g. of coconut oil fatty acids are distilled from a copper retort by means of superheated steam until about 1/10 of the amt. remains. The unsapon. matter is removed from this, according to the method of Allen-Thomson, and the fatty acids washed repeatedly with alc. of increasing conc. The residue in the case of pure coconut oil m. 67.7° but when the original oil is mixed with 10% of peanut oil the m. p. is 73°. A third method is to alcoholize 50 g. of the fat according to the method of Haller and then to distil the esters obtained under diminished pressure until only about 10 g. remains. This residue is saponified and tested for arachidic acid by the method of Tortelli and Ruggeri An oil mixed with 10% of peanut oil gave 0.150 g. of fatty acids with a m. p. of 73°.

Paleni, Andrea and De Lorenzi, Franca

EVALUATION OF TESTS USED FOR PEANUT OIL AND CRUDE AS WELL AS REFINED OLIVE OILS

Ann. chim. applicata 29, 253-71(1939); C.A. 33, 8044 (1939)

The methods of Bellier (crystn. of total fatty acids at about 2% concn. in 70% alc.) and of Blarez (cf. C.A. 1, 2827) (based on the insoly. of the K soaps of solid fatty acids in 90% alc. at 10°) do not give as good results in evaluating oils as does the method of Tortelli and Ruggeri which is based on the crystn. of solid acids sepd. from the total acids by 90% alc.

Pazzaglia, Lorenzo

THE COLOR REACTIONS OF VEGETABLE OILS.

Chim. ind. agricolt. biol., 6, 45-9 (1930); C. A. 24, 2625 (1930).

The most common vegetable oils may be classified in 2 classes: (1) olive, peanut and almond oils, that give pale yellow colors with the ordinary reactions (Hauchecorne, Bellier, Heyndereich, Brulle); (2) sesame, rape, cottonseed and linseed oils, that give brown or red colors.

Popoff, M. and Konsuloff, S.

THE SEROLOGICAL DIFFERENTIATION OF VEGETABLE OILS.

Z. Unar.-Genussm. 32, 123-6(1916); C. A. 11, 2051 (1917).

An effort to detect the presence of peanut or sesame oil in olive oil by the use of a sp. precipitin reaction for the oils. Five g. of peanuts or sesame seeds were extd. with 25 cc. of physiol. salt soln. This ext. was injected into rabbits (over 1 yr. old) at intervals of 5-10 days, beginning with 5 cc. and later 10 cc. After 5-8 injections the precipitins were well developed. The animals were bled after a fast of 24 hrs. and the serum was kept sterile. The precipitins thus obtained were added to exts. of peanuts or sesame seeds (in various dilns.) and also to emulsions of the oils in the proportion of 1 cc. ext. and 0.1 cc. serum, and the reaction noted after 12 hrs. Pure olive oil gives no reaction. Mixts. of olive and peanut or sesame oils show a reaction, as well as exts. of the latter in dilns. from 1:10 up to 1:1000. The ppte. strength of the serum weakens with the length of time elapsing between the injections and the use of the serum, but may be increased by new injections. The results are only qual. but 10% peanut or sesame oil in olive oil was detected. Only such oils give the reaction as were obtained by pressing or extn. under 65°.

Powell, A. D.

THE DETECTION OF PEANUT OIL IN OLIVE OIL.

Analyst 50, 395-6(1925); C. A. 19, 3167 (1925).

In Luer's modification of Fleiler's test for peanut oil a ppt. of K acid palmitate is sometimes obtained accompanied by some unsaponifiable matter. The following modified test is designed to eliminate this difficulty and will detect 5% of peanut oil in olive oil. Saponify 1 g. of the oil with 5% KOH in 90% alc., heating 5 min. under a reflux condenser. Dil. with 25 cc. of water, shake well with 30 cc. of ether and sep. the layers. To the aq. portion add 2 cc. of concd. HCl and ext. the fatty acids by shaking with 20 cc. of ether. Wash the ethereal soln. last obtained with 10 cc. of water, evap. off the ether and dry in the water oven for 10 min. Dissolve the fatty acids in 50 cc. of 70% alc. and keep the soln. at 14-15° for an hr. or more. The m. p. of the ppt. should be taken in all cases where pptn. occurs above 14°. In the absence of arachidic acid, the original ppt. of fatty acids after being washed with cold 70% alc. should m. at 52-54° and at 60-61° after recrystn. from 90% alc. The abnormal behavior of certain oils free from peanut oil is probably a result of modern methods used in extg. olive oil; there is a possibility of some kernel oil being included and this probably contains stearic acid.

Prescher, J.

THE DETERMINATION OF THE ORIGIN OF HYDROGENATED FATS AND THE COLOR REACTION OF TORTELLI AND JAFFE.

Z. Nahr.-Genussm. 30, 357-61(1915); C.A. 10, 789 (1916).

(1) Hydrogenated fish oils are present when the Tortelli-Jaffe reaction (C.A. 2, 1255) and either the Kreis-Roth test for arachidic acid or the cholesteryl acetate test are positive. (2) Simultaneous positive results of the Kreis-Roth and phytosteryl acetate tests may show rape oil as well as peanut oil. (3) Positive Soltsien and Baudouin tests prove the presence of sesame oil. A very low sapon. no. indicates rape oil. (4) Hydrogenated cocoanut and palm kernel oils can be detected by their high sapon. nos. (above 230) and by the Reichert-Meissl nos. and Polenske nos. which are peculiar to the crude oils. (5) In the detection of hydrogenated castor oil and cottonseed oil the hydroxyl no. of the former and the Becchi and the Hauchecorne reactions on the latter are of value. (6) The ratio of the I no. to n is not the same with hydrogenated fats as with animal fats. Cocoanut fat of a tallow-like nature is recognizable from other hydrogenated fats by its low I no. If other fats have a low I no. they must be tallowlike fats of unusually high m.p. (7) The Bellier reaction has only the most limited application to the detection of hydrogenated fats.

Pritzker, J. and Jungkunz, R.

HAZEL-NUT OIL. THE DETERMINATION OF ARACHIDIC ACID.

Z. Nahr.-Genussm. 42, 232-41(1921); C.A. 16, 1159 (1922).

Search for a sp. color reaction for this oil resulted in failure. No trace of arachidic acid could be found in hazel-nut oil. For the detection of peanut oil in mixts., a suitable modification of the method of Fachini and Doria (C.A. 8, 1312) was employed which gave fairly accurate results with mixts. of peanut and hazel-nut oils and peanut and olive oils but much too high results with peanut-cottonseed mixts. Phytosterol was detd. in hazel-nut oil by the method of Kühn and Wewerinke (C.A. 2, 1079), filtering the fatty acids by suction instead of without as in the original method.

Provvedi, Fosco

COLOR REACTIONS OF VEGETABLE OILS.

Olii minerali, olii e grassi, colori vernici 16, 103-4(1936); C.A. 31, 4147(1937).

Carr and Price's reagent (cf. C.A. 20, 3020) (1-2 cc. oil and 4-5 cc. reagent) gave in 5 min. with cottonseed oil dark red-brown, olive oil light green, sesame oil very light pink-yellow, peanut oil very light pink, colza oil blue-green, rape-seed oil very light green, poppy-seed oil yellow, apricot oil very light sky blue with slight opalescence, sunflower oil brown-yellow (turbid), grape-seed oil green-brown (turbid), corn oil yellow, soybean oil violet-gray with slight opalescence, raw linseed oil green (turbid), boiled linseed oil black-green (turbid), sweet-almond oil violet-blue with slight opalescence. Rancid colza oil reacts similarly to cottonseed oil. Rancid olive oil behaves differently from the neutral, and the chloroform soln. of $SbCl_3$ can be used to detect rancidity by development of a visible opalescence. In nonrancid oils the reagent identifies cottonseed oil.

Raalte, A. van

BELLIER'S REACTION FOR VEGETABLE OILS.

Chem. Weekblad 16, 959-60(1919); C.A. 14, 2099(1920).

The benzene used for this reagent must be free from thiophene; otherwise a dirty green, instead of a violet, coloration is obtained.

Richmond, H. D. and Powell, A. D.

BELLIER'S MODIFIED TEST FOR PEANUT OIL.

Analyst 50, 285(1925); C.A. 19, 2753(1925).

It is probably unsafe to rely on B.'s test without sepg. the fatty acids and taking the m.p. after repeated crystn.

Rosenthaler, L. Bern.

MICROCHEMICAL TESTS FOR OILS AND FATS.

Schweiz. Apoth.-Ztg. 58, 545-9, 562-7, 578-83(1920); C.A. 15, 952(1921).

To 2 mg. of the oil on a slide add a drop of the satd. alc. KOH or NaOH reagents. Crystn. takes place at once with arachis and olive oils; rape, castor and poppy oils yield characteristic forms. Cod-liver oil is unique in giving no crystals with KOH; it yields crystals with NaOH. The effects of KOH and NaOH are generally different. With KOH, the seeds of peanuts, almonds, peach, cacao and ricinus show the same effect as their resp. oils; this is true of ricinus seeds with NaOH also. Sketches of the crystals are shown.

Ruebenbauer, H.

ADULTERATION OF PEANUT OIL WITH COCONUT OIL.

Przemyst Chem. 19, 9-10(1935); C.A. 30, 314(1936).

A 10% admixt. of coconut oil can be detected because it has a lower sp. gr., n and I value, but a higher sapon. value, Reichert and Meisl, and Polenske values. Polish laws prescribe labelling of mixed edible oils as "edible oils" to distinguish them from olive oil in native parlance.

Sage, C. E.

STANDARD OF PURITY OF OLIVE OIL.

Pharm. J. 110, 515-6(1923); C.A. 17, 3798(1923).

The Brit. Pharm. and com. standards are compared. They do not always agree, as e.g., some pure olive oil may give the test for sesamum oil, and arachis oil when tested for by the B. P. method may escape detection in an impure oil. The term "refining" used in B. P. should not apply to the neutralizing treatment of a low grade rancid oil, e.g., of 8-10% acidity. The taste of a treated oil becomes quickly unpleasant, while the flavor of a natural oil improves with age. The I no. of 79-87 given in B. P. are fair, and allow for slight acidity since this involves a rise in I no. The limits found by S in the English market are 80-5. The raising of the I no. limit is not advisable, as it also tends to invite admixt. with arachis or rape oil.

Schnell, J.

(DETECTION OF SESAME OIL IN) EARTHNUT OIL, ETC.

Zeit. Nahr. Genussm., 1902, 5, 961-963; B.A. 1903, ii 191

Equal portions of the oil and stannous chloride solution (German Pharmocopoeia strength) are shaken in a test-tube and the latter placed in boiling water until its contents have separated. A pink coloration indicates the presence of sesame oil. The test is particularly applicable in the case of margarines coloured with methyl-orange or some other tropoeolin, the extraction of these colours with hydrochloric acid before applying the test being unnecessary. The author also mentions that East Indian samples of earthnut oil give iodine values as high as 95.0, this value being considerably above that usually ascribed to earthnut oil.

Shelley, F. F.

BELLIER'S MODIFIED TEST FOR PEANUT OIL.

Analyst 50, 182(1925); C.A. 19, 2139(1925).

Imported olive oil has been condemned as contg. 5% of peanut oil because a cloudiness was obtained at about 16° in a rapid modification of B.'s test, adding 1.5 cc. of Adler's AcOH soln. to the sapond. oil and omitting the HCl from the alc. By the use of Luer's modification, in which 3 drops of glacial AcOH are added to the sapond. product, no turbidity results. It is doubtful whether the analyst is justified in condemning the oil because of the aforesaid cloudiness at 16°.

Shelley, F. F.
DETECTION OF PEANUT OIL IN OLIVE OIL.
Analyst 51, 493(1925); C. A. 20, 2084 (1926).
The presence of stearic acid in com. brands of olive oil may account for the formation of a ppt. in Bellier's test.

Siegfried, K.
THE BELLIER REACTION OF PHARM. HELV. V.
Pharm. Acta Helv. 9, 211-16 (1934); C. A. 29, 7585 (1935).
The Pharm. requires a pos. reaction for 7 seed oils, e.g., almond oil and peanut oil, but certain com. oils fail to show the reaction. With the 2 oils named, treatment with bolus, fuller's earth or charcoal failed to destroy the substance giving the test, even at temps. up to 120°. However, as soon as a chem. bleaching agent was applied, e.g., Bz_2O_2, the reaction was no longer obtainable. The chem. character of the substance giving the test is still unknown.

Smith, W. P., Bur. Animal Ind., U. S. Dept. Agr.
THE APPLICATION TO SOLID FATS OF RENARD'S TEST FOR PEANUT OIL.
J. Am. Chem. Soc., 27, 1756-7; C.A. 2, 715 (1908).
In working with mixtures of solid fats and cottonseed-oil the author, by using Tolman's modification of Renard's test for peanut oil, obtained in nearly every case a precipitate at the point where arachidic acid should come down, although the precipitate was at the point where arachidic acid should come down, although the precipitate was often gelatinous in appearance, whereas the arachidic acid is crystalline. Results obtained with oleostearin, lard, and the same lard with 10% of peanut oil admixed show that the amount of solid acids in oleostearin and lard crystallizing at 15° from 90% alcohol is far greater than in peanut oil, although the temperature at which crystallization begins is far lower. The cause of the precipitation, which is supersaturation of the solution, differs in this instance in that the arachidic acid precipitates because of its slight solubility in 90% alcohol, while the other acids come down because of the large amount of them in the solution. The melting points of the crystals from the pure lard and those from the lard containing 10% of peanut oil are about the same and therefore not conclusive. The crystals were recrystallized and the melting points redetermined and found to be pure lard 55°, lard with 10% of peanut oil 77°, showing that nearly pure arachidic acid had been obtained in the latter case. The results of the author show that the addition of fats containing large percentages of solid fatty acids to cottonseed or other oils interferes with the detection of peanut oil by this method. He suggests recrystallization of the arachidic acid until a melting point higher than that of stearic acid is obtained when the presence of arachidic acid is established.

Soltsien, Paul

OCCURRENCE AND DETECTION OF SESAME OIL IN COMMERCIAL ARACHIS OIL
Chem. Revue, 1901, 8, 202-203; C. A. 1902, ii 114

Tamson has stated that the fatty acids obtained from arachis oil give, like sesame oil, the Baudouin furfuraldehyde reaction. The author has fully investigated this matter and states that there is hardly any commercial arachis oil which does not contain sesame oil either by actual adulteration or from the fact that often arachis oil is pressed after sesame oil. Samples prepared by the author never gave the reaction.

When applying Baudouin's test to the fatty acids, it must be borne in mind that the active principle of sesame oil is somewhat soluble in mineral acids and, in consequence, gets partly removed; however, the presence of 1 per cent. of sesame oil in arachis oil may be safely detected when operating with the fatty acids; stannous chloride should not be substituted for furfuraldehyde as it causes the fatty acids to turn brown.

Stock, Erich

DETECTING ADULTERATION OF WOOD OIL FROM INDO-CHINA (ABRASIN OIL) WITH CASTOR OIL AND PEANUT OIL.
Farben-Ztg. 36, 173(1930); C. A. 25, 423 (1931)

A wood oil from Indo-China with the following consts.: sp. gr. 0.935, acid no. 8, n_D 1.512, and sapon. no. 193 was mixed with varying proportions of castor oil, peanut oil and both. From the detn. of the above consts., definite conclusions regarding the compn. of the mixts. could not be drawn.

Thomas, A. W. and Yu, Chai-Lan.

DETERMINATION OF THE MIXTURE OF ARACHIDIC AND LIGNOCERIC ACIDS IN PEANUT OIL BY MEANS OF MAGNESIUM SOAPS.

J. Am. Chem. Soc. 45, 113-28(1923); C. A. 17, 645 (1923).

The following solv. detns. (g. per 100 cc. of soln.) at 25° in 91.53, 86.16, and 83.07% alc. (by wt.) were made: stearic acid 1.303, 1.014, 0.087; lignoceric acid 0.182, 0.092, 0.011; Mg. stearate 0.006, 0.006, 0.005; mg lignocerate 0.005, 0.005, 0.006, Mg oleate 6.64, 5.35, 3.8%. K salts (in 91.53% alc.): stearate 0.403; lignocerate 0.123; oleate 25.2. Pb salts in Et_2O: stearate 0.015; lignocerate 0.018; oleate 6.46. A new method, based upon the above soly. detns., for the quant. detn. of peanut oil is proposed; it has the following advantages: (1) The const. errors, such as are involved in the solubilities of the Pb soaps in Et_2O, are reduced to a min.; a direct and more rapid sepn. of satd. and unsatd. acids in peanut oil is accomplished without the use of a second solvent; higher % yields of arachidic and lignoceric acids than those from the "Pb salt-Et_2O" method are obtained; common vegetable oils, including cold drawn cottonseed oil, do not interfere with the quant. detn. of peanut oil at either 20° or 25°. The method is not intended for the sepn. of satd. from all unsatd. acids in all fatty oils, as Mg erucate and an unsatd. soap from tung oil (probably oleomargarate) are insol. in 90% alc. (by vol.) (see following abstr.). The soln. left after the detn. of the sepn. no. may be utilized for the sepn. of the mixt. of arachidic and lignoceric acids by the proposed method, affording an excellent qual. and fair quant. method for identifying peanut oil. The method is briefly as follows: About 10 g. of the oil is saponf. with alc. KOH, treated while still warm with alc. AcOH and then with alc. KOH until it gives a permanent pink color with phenolphthalein treated with 25 c. c. alc. $Mg(OAc)_2$ (50 g. salt in 400 cc. alc.), heated just to boiling and allowed to stand overnight at about 10°; the resulting insol. Mg soaps are boiled 5 min. with 100 cc. of 5 N HCl and after a few min. slowly treated with cold H_2O; the ppt'd. acids, after being washed free from Mg and Cl ions, are allowed to stand overnight in 60 cc. alc. at 20° or 25°; the crystals which sep. are washed with 90 and then with 70% alc. (the vol. of the filtrate and the 90% alc. washings being noted), dissolved in abs. alc. and evapd. and dried to const. wt. at 80° in a weighed flask, the wt. found being corrected for the amt. of arachidic and lignoceric acids remaining in the filtrate and 90% alc. washings. The mixed acids so obtained m.71-3°, contain no ash, have no I no. and have a mean mol. wt. of about 340°; after another recrystn. from 90% alc., they m. 75-6°. The method, applied to Spanish, Roms, Java, Virginia, Alabama, Mexican and China crude peanut oils, gave 5.19-5.48% total acids; five refined oils gave 4.79-5.13% acids. The Pb salt Et_2O method with 3 of the above crude oils gave 4.75-5.37% acids.

Tobia, M.

IMPROVEMENT IN THE METHODS FOR DETERMINING THE SAPONIFICATION AND SOAP NUMBERS, AND DETECTING PEANUT OIL AND UNSAPONIFIABLE MATTER.

Olii minerali, olii grassi, colori vernici 11, 23-5(1931); C.A. 26, 1817 (1932).

Weigh 1 g. of oil in a 150-cc flask, add 20 cc. of a soln. contg. 25 g. KOH in 32-cc. water, make up to 500 cc. with 95% alc. Attach the small flask to a reflux condenser, and heat on a water bath. After sapon. cool, pour the contents into a tared 200-cc flask. Add the washings of the small flask and reflux condenser; neutralize the soap soln. with N HCl and phenolphthalein, bring to vol. and agitate. Place in a 500-cc. flask with glass stopper 50-cc. 0.2% $BaCl_2$ dil. with 200-cc. distd. water and add 5 cc. of the soap soln. Close the flask, agitate and add 5-cc. portions until $BaCl_2$ is nearly consumed. Then add the soap 1 cc. at a time, and later drop by drop until the froth of 1 cm. has very small bubbles persisting for 5 min. The cc. of soap used is the "soap no." Olive oil has a soap no. 57.5, hazelnut oil 60, raw linseed oil 75, almond oil 60.8, peanut oil 61, rape oil 65, sesame oil 64.5, soy oil 68.5, walnut oil 73.2, castor oil 180, cod-liver oil 75. Variations were noted in olive oil from different places, and in adulterated olive oils. For simultaneous detection of peanut oil, detn. of sapon. no. and detection of unsaponifiable matter, place 1 g. of the oil in a 150-cc. flask, add 15 cc. of alc. KOH soln., and heat under a reflux condenser on the boiling water bath with agitation. After sapon. close flask with a stopper carrying a thermometer, and cool. At 12° crystals confirm peanut oil. Remove the stopper, wash the thermometer, adding the washings to the flask, warm slightly to dissolve the crystals if present, add 5 cc. of KOH soln. and a drop phenolphthalein and titrate the alkali in excess. The difference between the acid used for neutralizing 20 cc. of KOH in a blank trial, and the cc. now needed gives the sapon. no. Pour the neutral liquid into a 200-cc. flask, add the washings of the small flask and bring to vol. to detect unsaponifiable matter.

Torrini, U.

A PRACTICAL METHOD FOR THE DETERMINATION OF PEANUT OIL IN OLIVE OIL.

Ann. Lab. chim. contr. Gabelle, 6; Giorn. farm. chim., 61, 560-1; C. . 7, 1243 (1913).

T. makes use of the fact that K arachidate is almost insol. in strong EtOH (especially in presence of free alkali) to det. presence of peanut oil in mixts., even when as little as 5% is present. One cc. of oil is allowed to drop into a 2 x 18 cm. test tube, and then 5 cc. of pure alc. KOH (15% in 90% alc.). A reflux condenser is applied, and the mixt. warmed. Sapon. is complete almost at once with the b. of the liquid. Boil 2-3 min., intermittently in order not to lose solvent. Cool to a temp. equal to heat of the hand, remove stopper, and add at once 10 cc. EtOH, exactly 90°. Shake thoroughly several times, insert a thermometer, and stir at a temp of 12°. Then allow to stand at 10° for 1-1/2 hrs. In presence of peanut oil a turbidity occurs, clinging to the bottom of the tube, while crystals of K arachidate form on the walls of the tube. Pure olive oil, under above conditions, gives a clear limpid fluid which remains so for many hrs. Adulterated with cotton-seed or sesame oil, this cloudiness occurs; 5% adulteration may be readily detected.

Tortelli, M. and Ruggeri, R.

OLIVE OIL, METHOD OF DETECTING COTTON, SESAME, AND EARTHNUT (ARACHIS) OILS IN.

Chim. Zeit. 1898, 22, (60), 600-3; J. Soc. Chem. Ind. 1898, 876-7.

The authors have combined their process for the detection of cotton-seed oils (this Journal 1898, 607)with modifications of Baudouin's test for sesame oil and Renard's test for earth-nut oil. The liquid fatty acids obtained in the manner described, though in this case from 20 grms. of the oil instead of 5 grms., are first tested for cotton-seed oil by their modification of Becchi's test. Another portion of the liquid acids is tested for sesame oil with furfural and hydrochloric acid. The authors have found that the whole of the substance which gives the violet coloration in sesame oil dissolves in the liquid fatty acids, whereas none of that which causes some kinds of pure olive oil to give a very similar coloration, in this test (this Journal, 1898, 275) is ever present in them. It is stated that as little as 1 per cent. of sesame oil can be detected in this way. In order to detect the presence of earthnut oil, the lead soaps remaining insoluble in ether, are washed with ether, and shaken in a flask with 220 cc. of ether, and a little 20 per cent hydrochloric acid, in order to liberate the fatty acids. The ethereal solution of these is washed with water, filtered, the ether distilled off, and the residue cautiously shaken in a stoppered flask over the hot water bath, with 100 c.c. of 90 per cent. alcohol, until a clear solution is obtained and the temperature has risen to about 60°C. The flask is then transferred to a white surface and the solution allowed to cool. If earthnut was present in the original oil, a deposit consisting of a mixture of fine needle-shaped crystals

(lignoceric acid) and thin tabular crystals (arachidic acid) is obtained. This crystalline precipitate is thoroughly characteristic of earthnut oil, and appears when the olive oil contains even less than 5 percent. of that oil. The temperature at which the crystallization commences gives an approximate idea of the amount of earthnut oil originally present, as is shown in the following table:

Solution in 100 c.c. of 90 per cent. Alcohol at about 60° C.

Temperature at which crystallization commences.	35°-38°	31°-33°	28°-30°	25°-26°
Original amount of earthnut oil in the mixture.	100	60	50	40
Temperature at which crystallization commences.	22°-24°	20.5°-21.5°	18°-20°	15°-17°
Original amount of earthnut oil in the mixture.	30	20	10	5

If a more exact determination is required, the precipitate which forms in the alcohol, after standing for about three hours at 15°-20°C. is collected on a filter and washed with three successive portions (10 c.c. each) of 90 per cent. alcohol and then with 70 per cent alcohol. It is dissolved off the filter with boiling absolute alcohol, the latter completely evaporated, and the residue re-crystallized from 90 per cent. alcohol. The precipitate is collected and washed in the same way as before, and is finally dissolved off the filter into a weighed basin by means of boiling absolute alcohol. The solvent is evaporated and the residue dried to constant weight at 100°C. and its melting point determined. By this process a mixture of lignoceric and arachidic acids, melting at 74° to 75.5°, is obtained, and from the weight of the residue, plus the amount which has dissolved in the 90 per cent. alcohol, the precentage of earthnut oil in the original mixture can be calculated. The co-efficients of solubility of arachidic and lignoceric acids in alcohol are different, but the necessary allowance can be made by reference to the subjoined numbers experimentally determined by the authors:

Of a Mixture of the acids melting at 74°-75.5°.	100 c.c. of 90 per cent. Alcohol dissolve at: T=15° Grm.	T=17.5° Grm.	T=20° Grm.
1. Weight between 2.7 and 0.5 grm.	0.070	0.080	0.090
2. Weight between 0.47 and 0.17 grm.	0.050	0.060	0.070
3. Weight between 0.11 or less grm.	0.033	0.040	0.045

The authors state that according to their experiments the quantity of the mixture of these acids normally present in earthnut oil fluctuates between 4.30 and 5.40 per cent. but 4.80 per cent may be taken as the mean for practical purposes. Hence the

combined residue and dissolved portion multiplied by 5 gives the original percentage of that oil in the mixture.

By the original method of Renard and its modifications, 4 to 5 per cent of arachidic acid, melting between 69.5 and 72°, is obtained from earthnut oil, whilst by the author's process the proportion of the two acids and their melting point is as mentioned above. This difference is attributed partly to loss during manipulation and partly to too low a solubility coefficient in Renard's process. Renard found that 100 c.c. of 90 per cent. alcohol dissolved 0.022 grm. of arachidic acid at 15°C. and 0.045 grm. at 25° and these co-efficients have since been used in calculating the percentage of earthnut oil in a mixture. In no case, however, have the authors obtained so small a co-efficient of solubility in their practical determinations, even when the percentage of earthnut oil in a mixture was as low as 5 per cent. The table of the solubility of the mixed acids which is given in brief above is given again more fully in an appendix, and the authors conclude their paper with a table giving the results of the determination of earthnut oil mixed in known proportions with olive oil. According to these the method is capable of estimating the oil within 1 or 2 per cent of the actual proportion.

Tortelli, Massimo and Ruggeri, R.

DETECTION OF COTTONSEED OIL, SESAME OIL, AND EARTH-NUT OIL IN OLIVE OILS.

Zeit. angw. Chem., 1898, 850-853; B. A. 1898, ii, 653.

The authors (this vol., ii, 465) have devised a process for the detection of cotton-seed oil in edible oils; and they now extend this method to the detection also of sesame or earth-nut oil. To detect sesame oil, 5--6 c.c. of the liquid fatty acids is shaken with an equal bulk of strong hydrochloric acid and 2 drops of a 1 per cent alcoholic solution of furfuraldehyde. Even if only 1 per cent of the adulterant is present, it gives a characteristic carmine-red colour to the acid.

To test for earth-nut oil, the insoluble lead soap is first thoroughly exhausted with ether, and then shaken with this solvent in the presence of dilute hydrochloric acid. The ether is distilled off, and the residue of fatty acids is dissolved in 100 c.c. of 90 percent alcohol containing a drop of dilute hydrochloric acid, and the whole is heated to 60°. After cooling to 10-20° for about 3 hours, the crystalline precipitate of lignoceric and arachidic acids is filtered off and washed, first three times with 10 c.c. of 90 percent alcohol, and then several times with alcohol of 70 percent; it is then dissolved off the filter by boiling absolute alcohol, and to the filtrate is added 100 c.c. of 90 percent alcohol and a drop of weak hydrochloric acid; after heating to 60°, the whole is allowed to cool for 3 hours. The crystals are washed as before, and, finally, redissolved in boiling absolute alcohol. After evaporating the solvent, and drying the fatty acids at 100°, the melting point is taken; if this is between 74° and 75.5°, it indicates the presence of earth-nut oil. The percentage divided by 0.048 represents the amount of the adulteration.

Tortelli, Massimo and Ruggeri, R.
ESTIMATION OF ARACHIS OIL
Chem. Centr., 1902, i, 833; from Mon. sci., (iv), 16 215-217.
Compare Abstr., 1898, ii, 653; B. A. 1902, ii 539

According to Archbutt (Abstr., 1899, ii, 269), the melting point of the mixture of arachic and lignoceric acids obtained from pure arachis oil is between 71° and 72.5°, whilst the authors had previously found it to be 74-75.5°. The discrepancy is probably due to the method used. Archbutt's method of partial precipitation of the soap with lead acetate, instead of using an excess, is according to the authors not so trustworthy as their own process.

Trim, F. H.
USE OF THE REFRACTOMETER IN ASCERTAINING THE PURITY OF REFINED EDIBLE OILS.
J. Soc. Chem. Ind. 39, 307-8T(1920); C. A. 14, 3539 (1920).

Dual mixts. of coconut, palm-kernel, and arachis oils can be accurately detd. by the n_D and also by the m. p. detn. Triple mixts. of the above oils can also be detd. using n_D and m. p. Tables and graphs are given showing the relationship of these consts. with progressive differences of 10% between the oils.

Vasterling P.
EARTHNUT OIL IN OLIVE OIL.
Pharm.-Ztg., 54, 490-1.; C. A. 3, 2515 (1909).

A review and discussion of the methods in use with criticisms.

Vierth, M.
DETECTION OF ARACHIS OIL IN OLIVE OIL.
Chem. Centr., 1899, i, 383-384; from Pharm. Zeit., 43, 924; B. A. 1899, ii 583

The author agrees with Tortelli and Ruggeri (Abstr., 1898, ii, 653) that the only trustworthy test for the presence of arachis oil in olive oil is the melting point of the isolated arachidic acid. Thirty grams of the sample is saponified with 12 per cent. alcoholic potash, the fatty acids are liberated by means of hydrochloric acid, and then dissolved in warm 90 per cent alcohol. This solution is precipitated with alcoholic solution of lead acetate, and the precipitate is extracted with ether. The insoluble mass is then decomposed with hydrochloric acid, and the fatty acids dissolved in excess of warm 90 per cent alcohol. When cold, the arachidic acid crystallizes out, and is collected on a filter and washed with cold alcohol; it is then dissolved in boiling alcohol, evaporated in a tared dish and weighed, allowance being made for the slight solubility in cold alcohol. The melting point should be 71°, but it will be necessary to carefully recrystallize several times from hot alcohol before a satisfactory result can be obtained.

Vollertsen, J. J., McCleod, W. G. and Osborn, H. G.
THE TITER AND IODINE NUMBERS OF MIXTURES OF VEGETABLE STEARIN (HYDROGENATED) AND COCONUT AND PEANUT OILS.
Cotton Oil Press 3, No. II, 30-3(1920); C.A. 14, 2724(1920); cf. C.A. 13, 3327.

The titers of mixts. of vegetable stearin and coconut oil containing from 5 to 20% of the former are lower than the calcd. values, and in some cases with 10% stearin lower than for pure coconut. Mixts. of stearin and peanut oil with less than 20% stearin show titers lower than those calcd. from values of the titers of the compds., but none of the mixts. have titers below that of straight peanut oil. The I nos. of all mixts. agree closely with the calcd. values.

Volmar, J.
USE OF FLUORESCENCE PHENOMENA IN ANALYSIS OF FOOD SUBSTANCES.
J. Pharm. chim. 5, 435-43(1927); cf. Dayle and Fabre, C.A. 18, 1454; Popp, C.A. 21, 282; C.A. 21, 2943(1927).

In Wood's light (cf. C.A. 20, 1639), milk and cream give a strong, yellow fluorescence; fat-free milk is dark. Adulteration of fresh milk by adding H_2O or removing cream is recognizable by deviation from a luminosity standard obtained with pure milk of known chem. standard. In old milk, i.e., after 24 hrs., a faint violet replaces the yelow color. Margarine (A) shows a beautiful indigo-blue fluorescence, butter only a faint yellow, suet and lard hardly any color. In mixts. of these, 10% + of A is readily recognized. Admixt. of 10-15% of grain oils (of cotton-seed, peanut, poppy, sesame, sweet almond) to pure olive oil is recognized by an intensely violet-blue color; olive oil shows feebly yellow to green. Wheat and rye flours show bluish fluorescence in Wood's light; this enables detection of admixt. with 15% of other flours. Antiseptics (salicylic acid (B), BzOH, abrastol (C) (cf. C.A. 3, 3128; 4, 1880) and saccharin (D)) must previously be isolated. The Na salts show strong fluorescence in Wood's light; this permits direct detection of B or BzOH in milk, after neutralizing with 0.1 N NaOH. Ext. C with EtOAc or AmOH in slightly alk. soln., evap. and hydrolyze with dil. HCl (Sanglo-Berriere, 1894), forming α,β-naphthol; its Na compd. produces blue luminescence. The light test for D (Na compd., violet effect), is sensitive to 1:2000.

Warren, T. T. P. B.

ACTION OF SULPHUR CHLORIDE ON OILS.

Chem. News, 57, 113; compare this vol., p. 199; B. A. 1888, 633.

While examining oils or oily mixtures, the melting point, consistency, viscosity, and other properties should be noted at the various stages: 5 grams of the oil are mixed first with 2 c.c. of carbon bisulphide, then with 2 c.c. of a mixture of equal parts of carbon bisulphide and sulphur chloride, and heated; at the completion of the reaction, the volatile products are expelled, and the appearance of the mass noted. This is then transferred to the filter-tube, washed with carbon bisulphide, and the extracted matter weighed. The colour, odour, etc., of both the insoluble and soluble products will in many cases indicate what oils they are. If the extract is turbid from deposited sulphur, the oil-mass, after it has been weighed, is treated with ether saturated with sulphur, and the weight of any residual sulphur is then deducted from the weight of the oil. The author gives an example of his mode of dealing with a mixture of two oils, both yielding solid products with sulphur chloride (loc. cit.) and points out difficulties arising from the solvent action of one oil on another. He has found arachis oil largely adulterated with cotton-seed oil.

Wolff, Hans and Rabinowicz, J.

DETECTION OF CASTOR OIL AND PEANUT OIL IN ABRASIN OIL.

Farben-Ztg. 36, 596-7(1930); C.A. 25, 2015 (1931).

Castor oil can be detected by the formation of octyl alc. on fusion with KOH. The amt. can be calcd. from the acetyl values of the sample and of an EtOH (80-85%) ext. Peanut oil can be detected by the formation of arachidic acid and detd. by means of its n, which is 1.468-72; that of abrasin oil is 1.517.

Andre, Emile

FRACTIONAL DIFFUSION--ITS APPLICATIONS TO THE PROXIMATE ANALYSIS OF LIPIDES AND MIXTURES OF HYDROCARBONS OF HIGH MOLECULAR WEIGHT.
Bull. soc. chim. 53, 60-72; Ann. combustibles liquides 8, 111-27(1933); C.A. 27, 2862(1933).

An app. (diffusor) is described for the fractional extn. of oils with suitable solvents. Applications of this method of fractional "diffusion" to the investigation of various oils (castor, peanut, liche liver and medicinal petrolatum) are given.

Aspegren, Herman.

SOME MACKEY TESTS ON COTTONSEED OIL.
Oil and Fat Ind. 6, No. 1, 19-24(1929); C.A. 23, 2055(1929).

A no. of detns. were made to show how the changes in cottonseed oil during hydrogenation would influence the Mackey test. It was shown that the heating curves gradually flatten out and the tendency to heat had nearly disappeared when the process had advanced so far as to reduce the linoleic acid content to 16%. With linoleic acid gone, but with 83% of isoleic and oleic acid, the fat did not show any tendency to spontaneous heating during the Mackey test. Other tests indicate that the same percent of glycerides of linoleic acid which have not been exposed to the hydrogenation process would have a tendency to develop a steeper heat curve than the same percent of these glycerides which have been exposed to the hydrogenation process. Crude cottonseed oil showed practically no tendency toward heating during the Mackey test. Possibly impurities may have a retarding catalytic influence. Heating curves of refined cottonseed, corn, sesame, olive, peanut and coconut oil indicate that with decreased percent of linoleic acid, the Mackey test heating curves flatten, and evidently are principally affected by the percent of linoleic acid and to a much less extent by the percent of oleic acid.

Bhattacharyya, G. N.

SOME INDIAN VEGETABLE OILS. III.
Indian J. Phys. 10, 403-11(1936); C.A. 31, 5192(1937); cf. C.A. 30, 7886.

In continuation of Pt. I, the viscosity and its variation with temp. within the range 75°-200° F. of the following Indian vegetable oils have been detd. with a standard Redwood Viscometer No. 1, viz., groundnut, chaulmoogra, neem, kapok, punnag and mahua. The viscosity within this range of temp. can be represented by a logarithmic formula of the form $\log \eta = \log A - \alpha t + \beta t^2 - \gamma t^3 + \delta t^4$ involving 5 consts., viz., $\log A$, α, β, γ and δ whose values have been evaluated. The observed values of viscosity at different temps. are in good agreement with their calcd. values from the above logarithmic formula. Chaulmoogra oil has the highest viscosity within the range 75°-190° F., and at 190° F. it is the same as that of Indian kapok oil. Punnag and neem oils have almost the same viscosity throughout the whole temp. range of investigation. Groundnut oil is the least viscous among these oils. The viscosities of these oils are higher than those of the mineral oils which are generally used as liquid dielectrics. At 75° F. the viscosities of these vegetable oils vary from 766 sec. to 275 sec. whereas those of mineral oils vary from 250 sec. to 95 sec. So far as the viscosity is concerned these oils possess no advantage over the mineral oils as insulating oils but may be more suitable as lubricants. Tables and graphs are given.

Bhattacharyya, G. N.

SOME INDIAN VEGETABLE OILS. IV. ABSORPTION OF AIR.

Indian J. Phys. 11, 65-72(1937); C. A. 31, 5192 (1937).

The absorption of air by groundnut, olive, sesame, chaulmoogra, Indian rape and Indian kapok oils was measured at room temp. by a manometric method. Results are tabulated. The absorption coeffs. for the above oils in the order given were: 0.09806, 0.09519, 0.07998, 0.08553, 0.09331, 0.11060. It was found that air absorption by an oil takes place very slowly when the oil is at rest. The values of the Bunsen absorption coeff. for these oils are of the same order of magnitude as those of the mineral oils.

Bergell, C. and Lascaray, L.

SAPONIFICATION VELOCITY OF VARIOUS FATS.

Seifensieder-Ztg. 52, 191-4(1925); C.A. 19, 1785(1925).

Sapon. speed depends upon the area of contact surface; this is variable in emulsions according to the presence of peptonizing or coagulating agents, increasing or diminishing the surface. In order to maintain constancy of the strength of the reacting agents during their expts. B. and L. abandoned the ordinary sapon. with alkali and boiled instead 10 pts. of neutral fat, after removal of free acids by alc., with 90 pts. of a 50% soap soln. under reflux (C.A. 19, 409, 742) for several days of 8 hrs. each and detd. the resulting free acid at intervals. Coconut oil and lard soap were used as sapong. agents.

SAPON. WITH COCONUT OIL SOAP

No. of days	1		3		5		7		10	
	a	b	a	b	a	b	a	b	a	b
Coconut oil	63.9	24.6	131	50.2	173	66.5	196	75.6	229	88
Tallow	56.1	26.8	116	55.3	148	71.5	(157)	(75.0)	(184)	(88)
Lard	50.3	25.1	108	53.9	136	67.8	159	79.0	190	94
Peanut oil	47.0	23.2	106	52.3	(137)	(67.8)	146	72.2	(173)	(85.3)
Linseed oil	45.2	22.5	97.5	48.5	120.5	60	145	72.2	174	86.6

SAPON. WITH LARD SOAP

No. of days	1		3		5		7		10	
	a	b	a	b	a	b	a	b	a	b
Coconut oil	(33.1)	(12.4)	104	38.9	142	53.2	189	71.2	(228)	(47.5)
Tallow	33.1	15.8	83.8	40.0	126	60.0	142	67.9	186	88.7
Lard	20.5	10.2	79.8	49.1	115	57.5	135	67.6	181	87.0

In the tables the letter a represents the acid no. of the fat and b the degree of sapon. Only the acid no. can be used for this comparison. According to the Harkins-Langmuir theory of orientation the glycerol groups of triglycerides are directed toward the H_2O, the hydrocarbon chains toward the oil; while the homologs of satd. acids cover roughly the same surface, the oleic acid group covers approx. twice the area, so that the no. of mols. in a given space are smaller and the reaction velocity is therefore diminished; the velocity for fats is inversely proportional to their content of unsatd. acids. The com. sapon. by means of alkalies shows complex conditions: the velocity increases as the soap increases, but decreases as the fat disappears; different fats emulsify to a different degree; this property is connected with their capillary activity which with Na soaps reaches its max. in Na myristate, thereby explaining the ease and speed of coconut oil sapon.

Briault, Madeleine

THE COEFFICIENT OF FRICTION OF LUBRICATING OILS AND THEIR CONSTITUENTS. Pub. sci. tech. ministere air (France) No. 46, 29 pp.(1934); C.A. 31, 4095 (1937).

The coeff. of friction of mineral and vegetable oils was detd. with a modified Woog app., at 20-100°. The machine was loaded so that the pressure on the sliding surface was 1.5 kg. per sq. cm. The mineral oils had coeffs. from 0.105 to 0.169 at 20°. About half the oils showed no change in the coeff. with increasing temp., while the coeffs. of the remaining oils increased approx. 20% over the temp. range. The coeffs. of the following vegetable oils varied from 0.099 to 0.119 at 20°; linseed, poppy seed, hemp seed, cottonseed, rapeseed, peanut, olive and castor. The coeffs. of these oils remained const. with increasing temp. up to approx. 50°, and then dropped over a 5° interval to a new const. value approx. 10% lower. The following acid constituents of the vegetable oils showed the same friction temp. characteristics as the oils:

	Coeff. of Friction		Transition
Acid	Low Temp.	High Temp.	Temp.
Myristic	0.078	0.067	85-90°
Palmitic	0.116	0.097	80-85°
Oleic	0.128	0.097	75-80°
Ricinoleic	0.110	0.099	80-85°

The coeff. of pure glycerol is independent of temp. at a value of 0.175 up to 35° and with rising temp. increases to a value of 0.28 at 90°. The coeff. of glycerol remained const. Bu palmitate and Et ricinoleate showed approx. the same variations as their acids. The addn. of oleic acid to mineral oils up to 0.5% effected an increasing reduction in their coeffs. of friction, but further addns. had no effect. The mineral oils contg. 0.5% oleic acid had the same friction temp. characteristics as oleic acid alone with the exceptions that the decrease in the coeff. was only 10 to 20% above the transition temp. and that the transition temp. occurred at approx. 55°.

Carriere, J. F.

THE MANNER IN WHICH OIL AND OLEIC ACID BEHAVE TOWARDS WATER. Rec. trav. chim. 43, 283-96(1924); C.A. 2628(1924).

The behavior of films of peanut oil and oleic acid upon water is described in detail. The surface tension of oil and oleic acid upon water were detd. in dynes/ cm. The deductions of Harkins (C.A. 11, 731, 1538) and Langmuir (C.A. 11, 2849) are applied and discussed. The results of this investigation are generalized on the assumption that it would be accidental if the mathematical relation developed applied only to oleic acid and triolein. "In solns. of substances having capillary activity these accumulate in the surface or in an intersuperficial layer exclusively in mono-molecular layers. If the mols. are arranged in those surfaces according to the theories of Langmuir and Harkins (that is to say in satd. surfaces) the surface tension is in direct ratio of the square of the average distance of the mol. groups so arranged. It is without importance whether these groups are present as free mols. or whether several of them are bound one to the other."

Dieterle, R.

THE FOAMING OF FATTY OILS SUITABLE FOR FOOD.

Seifensieder-Zig. 66, 54(1939); C.A. 33, 9693(1939).

The tendency of linseed oil to produce a relatively stable foam on shaking can be used as a crude test to detect its presence in olive or peanut oil. Rape oil, soybean and cottonseed oil show some foaming tendency but very much less than linseed oil.

Duper, H.

THE EXAMINATION OF OILS.

Mitt. Lebenson Hyg., 2, 65-79; through J. Soc. Chem. Ind., 30, 907; C.A. 5, 3924(1911).

For detg. the critical temp. of soln., D. recommends a mixt. of 2 solvents, in one of which (isobutyl alc., amyl alc., acetone, petroleum ether or aniline) the oil is readily sol. and in the other (EtOH) less readily sol. Using a mixt. of 1 vol. of aniline and 4 vols. of alc. the following values were obtained: Olive oil (6 samples), 35.7-41.2°; arachis oil (3), 42.6-43.3°; sesame oil (2), 30-33.4°; poppyseed oil (1), 12.1°; walnut oil (4), 29.6-33.1°; colza oil (1), 42.3; cottonseed oil (1), 27.2°. The vol. of an oil does not increase proportionally with the temp. For ordinary purposes, the d_{15} can be calc. from that at higher temps. by means of the equation: $dt = dt' + 0.000665 (t' - t)$. As the diff. $(t' - t)$ decreases, the deviation of the calc. from the observed d. increases. For $t' = 98$ the d can be calc. to the third decimal place by means of the formula d_{15} = d at 98° + 0.0552.

Gardner, Hermann C. T.

SPECTROMETRIC EXAMINATION OF CERTAIN FIXED OILS AS A MEANS OF IDENTIFICATION

Analyst 46, 356-9(1921); C.A. 16, 168(1922).

Dissimilar oils exhibit dissimilar limits of visibility under similar conditions, while oils of the same kind show identical spectra as regards length, in the extent of the visibility of their spectra, under like conditions. The instrument used was a Browning's Student's Spectroscope fitted with a 1-1/4 in. dense prism and provided with an arc of 100° divided into thirds of a degree, having a vernier and lens, thus permitting angular measurements of the position of the axis of the telescope. The following table gives the spectrometric characteristics of a no. of oils.

Three in. of oil was used.

	Visibility of spectrum in the red ends at	Visibility of spectrum in the blue ends at	Approximate extent of visibility
Almond	43°	47.3°	4.3°
Arachis	43.3°	45.6°	2.3°
Castor	43.2°	45-45.3°	2-2.3°
Coconut	43.28°	47.3°	4.02°
Colza(2 in.)	43.3°	44.6°	1.3°
Refined English cottonseed oil	43.0°	46.6°	3.6°
Raw linseed	slight	45.0°	2.0°
Boiled linseed	43.3°	44.3°	1.3°
Neatsfoot	43.3°	45.64°	2.34°
Olive	nil	45.3°	2.3°
Sesame	43.16°	45.6°	2.46°

Six in. of oil was used.

	Visibility of spectrum in the red ends at	Visibility of spectrum in the blue ends at	Approximate extent of visibility
Almond	43.0°	47.0°	4.0°
Arachis	43.6°	45.3°	1.7°
Castor	6 inches,	not suitable for examination	
Coconut	43.3°	46.6°	3.30°
Colza(2 in.)	6 inches,	not suitable for examination	
Refined English cottonseed oil	43.0°	45.6°	2.6°
Raw linseed	slight	44.6°	1.6°
Boiled linseed	43.0°	44.3°	1.3°
Neatsfoot	43.6°	44.34°	0.74°
Olive	43.16°	45.16°	2.0°
Sesame	43.3°	45.0°	1.7°

From the exptl. data it seems evident that careful spectrometric observations afford a quick and ready means of identifying a fixed oil in the case of those specified. The variations in the extent of the visibility are most marked at the blue end of the spectrum. The lengths of the visible spectra are mostly different.

Gibson, K. S.

THE INFRA-RED ABSORPTION SPECTRA OF VEGETABLE OILS.

Bureau of Standards. Cotton Oil Press 4, No. 5, 53(1920); C.A. 14, 3328 (1920)

Measurements in the region 600-1360 millimicrons wave length by the thermopile-galvanometer-deflection method have been made on cottonseed, peanut, sesame and soybean oils. The results are shown in curves. The curves are practically identical between 980 and 1360 when reduced to the same value as 980. This is true irrespective of the bands in the visible spectrum and indicates that the infra-red absorption bands are a property of the oil itself rather than of the color substances such as chlorophyll.

Henk, Hans J.

THE IMPORTANCE OF ULTRAVIOLET FLUORESCENCE IN FIBER ANALYSIS.

Kunstseide u. Zellwolle 19, 426-7(1937); C.A. 32, 3621(1938).

Unbleached wool and silk show a light blue fluorescence, bleached wool light blue with white luster. American cotton gives a weak yellowish fluorescence with white luster but mercerized and bleached cotton appear bright yellow. Bleached fibers from the viscose process appear S-yellow with bluish shadows, which is lighter or darker depending on the degree of purity. The color of the unbleached fiber is straw yellow. Cuprammonium cellulose fibers are reddish white with milky-white turbidity. The shadows are bluish to bluish violet. Nitrate cellulose shines with flesh colors. Acetate cellulose fluoresces more intensively than any of the other rayon fibers. The coloration is bright violet to blue-violet and the shadows are strongly blue-violet. Unbleached sulfite pulp when dyed with the fluorescent Rhodamin 6 GD gives a blue-violet fluorescence. Unbleached soda pulp dyed with Sulforhodamin G shows a wine-red fluorescence while bleached pulp is greenish yellow. Different fibrous material show distinct differences in fluorescence when treated with the same dye. Thus with Oxydianil Yellow O cotton appears light yellow, natural silk brown, viscose silk green-yellow to green and cuprammonium cellulose deep yellow.

Linen and cotton can be differentiated by treating with a 5% soln. of hydroxy-quinolin sulfate, washing and then immersing in a 5% soln. of $ZnSO_4$. In ultraviolet light linen appears bright canary-yellow while cotton, even when mercerized, shows a dark violet coloration. Fluorescence may be used not only for identification of fibers but also for testing their quality, such as the presence of spots of foreign material, such as oils, which would not otherwise be noticed, but which would cause irregularity in dyeing. EtOH is fluorescent and should not be used for treating fiber to be tested. Et_2O pure petr. ether, AmOH and $CHCl_3$ are nonfluorescent. Liquids may be tested for fluorescence on filter paper or surgical cotton, both by reflected and transmitted light. Characteristic color bands are also formed when the liquid is allowed to rise in a capillary and dried. The following oils show the indicated colorations by reflected light, transmitted light and in a capillary, resp.: tech. olive oil, yellow with reddish luster, dirty yellow, rose; pure peanut oil, bluish gray, green-blue, lilac to white; cotton oil, white-yellow with blue luster and yellow surface ring, yellow, lilac with yellow luster at the lower half; pure linseed oil, chrome-yellow, yellow, bright lilac; raw linseed oil, reddish yellow, yellow, yellow-rose.

Holmboe, Carl Fred.

ENERGY CHANGES IN THE CATALYTIC REACTION OF FATTY OILS WITH HYDROGEN.

Ber. 71B, 532-41(1938); C.A. 32, 4812(1938).

A calorimeter for studying the heat of hydrogenation of fatty oils is described. The conditions for the catalytic hydrogenation of highly refined peanut oil (75% oleic acid glyceride, 15% linoleic and linolenic glycerides, and 10% satd. glycerides of palmitic, stearic and arachic acids) were detd. The value of $a = 1/t \ln (JZ \text{ max.}/JZ)$ (JZ = iodine no.) was found to be const. at any temp.; when the catalyst was poisoned, a decreased. The activity of the catalyst increased linearly from 37% at 150° to 100% at 210°. The heat of hydrogenation was calcd.

Jogarao, Ch. V.

OPTICAL INVESTIGATION OF SOME INDIAN OILS. III. INTENSITY OF THE SCATTERED LIGHT.

Proc. Indian Sci 4A, 621-4(1936); C.A. 31, 4147(1937).

The intensity of the transversely scattered light of dust-free oils (castor, olive, cocoanut, ground nut, gingelly oils) is measured by means of rotating-sector photometer. By use of values of compressibility, ns and depolarization available for the first two, the calcd. intensity of scattering agrees with the exptl.

Kohler, Rudolf

THE PRECIPITATION RULE IN THE FORMATION OF OIL EMULSIONS.

Kolloid-Z. 45, 345-8(1928); C.A. 22, 4314(1928).

In the emulsification of olive oil and of peanut oil contg. oleic acid with dil. Na_2CO_3 or NaOH solns. the amt. emulsified at const. alk. concn. and proportion of H_2O depends upon the amt. of oil. At low concns. of alkali and of free fatty acid in the oil the amt. emulsified is max. at an intermediate proportion of oil. Increasing the concn. of alkali increases the amt. of oil emulsified. The observations are explained by application of Ostwald's pptn. rule for adsorption peptization.

Lederer, E. L.

THE PHYSICAL CHEMISTRY OF FATTY ACIDS. I, II.

Seifensieder Ztg. 56, 278-9(1929); C.A. 24, 741(1930).

The soly. of metals at 190° in fatty acids from peanut oil is Cu. 0.009 g. (= 0.04%) and Al 0.042 g. (= 0.67%) per sq. m. per hr., Ni in stearic acid at 190° 0.062 g. per sq. m. per hr. A calcn. on this basis gives com. fatty acids a Cu content of 0.00004%. The effect of ultra-violet rays upon the color of fatty acids in the presence of metallic soaps is studied by treating a mixt. of technically pure stearic and oleic acids with varying amts. of metallic soaps and exposing to sunlight, ultra-violet rays (distance of 40 cm.) and darkness. The results are:

% Metal	8 Hrs. sunlight	2 Hrs. ultra-violet
0.04% Mn, Zn, Al and Pb	unchanged	unchanged
0.04% Ni	very slightly lighter	unchanged
0.04% Fe	markedly darker	markedly darker
0.04% Cu	markedly lighter	gently lighter
no metal	gently lighter	unchanged

III. Lederer, E. L. and Hartleb. O. Ibid 345-7.-

The sp. conductivities of capric, myristic, palmitic, stearic and oleic acids were detd. at 100-200°; the mirror-galvanometer method was used with an instrument, the sensitivity of which was 10^{-8} amp., inner resistance 23 ohms, 3 x 4 cm. electrodes, 0.6 cm. distance. The results were tabulated and by expressing them in a formula and extrapolating it to the temps. of the m.p. and b.p. L. and H. found that the elec. cond. of all fatty acids is approx. alike at each of these 2 fundamental points (m. p. $\lambda = 0.1 \times 10^{11}$; b. p. $\lambda = 2 \times 10^{9}$) and that the conductivities obey the law of corresponding states.

Lederer, E. L.

PHYSICAL CHEMISTRY OF FATTY ACIDS. IV. VAPOR PRESSURE, BOILING POINT AND HEAT OF EVAPORATION.

Seifensieder-Ztg., 57, 67-71(1930); C.A. 24, 2625(1930); cf. C.A. 24, 741-2.

From Nernst's vapor-pressure formula $\ln p = -(\lambda_0 / RT) + 1.75 \ln T - (\varepsilon / RT) + C$, L. calcd. values and prepd. a graphic table, by means of which the b.p. of an acid or acid mixt. at any partial vacuum, or the pressure at any given temp., can be calcd.

Note: The vapor pressure of peanut oil at 270° C. is given as 0.02 mm. in the original article. For further data see original.

Marcelet, Henri.

SPECTROGRAPHIC ANALYSES OF THE FLUORESCENCE OF SEVERAL VEGETABLE OILS.

Compt. rend. 190, 1120-2(1930); C.A. 24, 4223(1930).

A study was made of olive oil, raw and refined, olive-pulp, soy-bean, sesame, corn, grape-seed, peanut, tea, cotton, and orange oils. All of these give different emission spectra, and it was possible to det. the components of a mixt. of these oils when as little as 5 to 10% of one was present. The absorption spectra were also different from each other and from the emission spectra, and a similar accuracy of analysis was obtained.

Marcelet, Henri

CAPILLARY INDEX OF SOME VEGETABLE OILS.

Compt. rend. 198, 2073-4(1934) C.A. 28, 4925(1934); cf. C.A. 27, 5563.

Dubrisay's capillary index (cf. C.A. 18, 1074), detd. by the drop method with a 1% soln. of the oil in C_6H_6 and N/600 NaOH, shows marked and characteristic differences for crude and refined olive oil (averages 66.9 and 31.4, resp.), and between these and the indices of the usual substituents of olive oil: maize oil 15-19, soy bean 13, sesamum 58, groundnut 24; thus affording a means of detecting adulteration.

Marden, J. W. and Dover, M. V.

THERMAL VALUE OF FATS AND OILS. II. SULFURIC ACID OR MAUMENÉ NUMBER. DEWAR CALORIMETER, CALIBRATED WITH H_2SO_4 + H_2O.

Ind. Eng. Chem. 9, 858(1917). C.A. 11, 3453(1917).

Substance	Sp. heat	Temp.
Cottonseed Oil	0.474	20-30°
Peanut Oil	0.490	20-30°

Data on other oils are also given.

Margaillan, L. and d'Estaing, J. Giscard.

SOLUBILITY OF THE MIXED FAT ACIDS OF SOME VEGETABLE OILS IN AQUEOUS-ALCOHOLIC MEDIA OF VARIOUS STRENGTHS.

14 me Congr. Chim. Ind., Paris, Oct., 1934, 2 pp.; C.A. 29, 6443(1935).

Curves are given for the soly. at various temps. of the mixed fat acids of copra, arachis oil and castor oil as a function of the alc. strength of the solvent. The technic used is described. The general trends of the curves for the resp. oils are quite different.

Medina, Florencio and Clemente, Amando

PHYSICAL PROPERTIES OF SOME PHILIPPINE VEGETABLE OILS.

Univ. Philippines Natural and Applied Sci. Bull. 4, No. 1, 61-91(1934); C.A. 28, 7047(1934).

The oils studied are: calumpang, cashew, coconut, kapok, lumbang, palo-maria de la playa, peanut, pili-nut, tangan-tangan, tuba. Castrol XL and Mobiloil A. Their colors, optical rotations and melting and congealing points are tabulated. Only palo-maria and tangan-tangan oils show appreciable rotation. A low congealing point seems to indicate a drying oil. All the oils are completely sol. in Et_2O, C_6H_6, benzine, Me_2CO, $CHCl_3$, CCl_4 and CS_2. Only tangan-tangan oil is completely sol. in 95% EtOH even at room temp.; this is probably due to a high percentage of hydroxylated fatty acids and can be used in identifying this oil. Tables and graphs show the variation of sp. gr., n, surface tension and viscosity with temp. at 5° intervals. If Castrol XL and Mobiloil A are taken as standards, calumpang oil has the viscosity required of a lubricating oil.

Mehlenbacher, Virgil C.

FAT AND OIL MICROSCOPY.

Oil and Soap 13, 277-82(1936); C.A. 31, 281(1937).

Crystals of the following oils were studied microscopically with aq. KOH, aq. NaOH, KOH and NaOH in alc. and Bu alc., mixts. of KOH and NaOH in alc. and Bu alc., Br, I and phenylhydrazine; olive, kapok, soybean, rice bran, perilla, corn, palm, peanut, walnut, hempseed, mustard, sesame, cottonseed, teaseed, babassu, coconut, linseed, rapeseed, lard, beef fat, sardine, whale and several hydrogenated fats. Regarding the applicability of these methods to the analysis of mixts. it was concluded from examns.

of known mixts. that the possibility to differentiate various fatty substances in mixts. depends upon the compn. and concn. of the same. Some are easily identified while others lose all known characteristics when mixed. Twenty photographs of crystals are shown.

Mondain-Monval, P. and Marteau, S.
DIRECT OXIDATION OF OILS BY AIR. FORMATION OF PEROXIDES.
Ann. combustibles liquides 12, 923-8(1937); C.A. 32, 3154(1938).
When oils in contact with air flow slowly through a slightly inclined heated glass tube, oxidation is shown by the typical white fumes and luminescence, and the products contain alkyl peróxides in quantity. Oxidation begins at 150-225° and is marked at 180-300°. The lowest temps. are given by 6 mineral oils, paraffin, and cod-liver oil, followed by crude linseed and neat's foot oils, then by olive, rape-seed, earth-nut, and castor oils. Explosions in air compressors are attributed to these peroxides.

Normann, W.
THE EXPANSION OF FATS WHEN MELTING
Chem. Umschau Fette, Oele, Wachse Harze 38, 17-22(1931); C.A. 25, 3858(1931)
With a special dilatometer N. investigated the rate of expension of fats on heating, starting with solid fat at 20°. A myristo-laurin mixt. expands during melting at 35° 8500 cu. mm. per 100 g.; fully hardened linseed oil (almost pure stearin) expands up to 39°, then contracts from 39-47° to even below its original vol., then expands again and at 64-69° the vol. increase is 16,900 cu. mm. per 100g. Oleic acid shows a fairly uniform expansion without sudden increase at any one temp., but slight irregularities appear when the rate of freezing is varied. Elaidic acid expands at 40-5° by 15,300 cu. mm. and stearic acid near 70° by 16,300 cu. mm. per 100 g. More or less irregular curves are also shown for tallow, butter fat, compound lard, hardened soy-bean oil and hardened peanut and fish oils.

Rossi, Giuseppe.
THE ACTION OF SULFUR MONOCHLORIDE ON FATTY OILS.
Ann. chim. applicata 26, 251-8(1936); C.A. 30, 7886(1936).
The change in viscosity of olive, cottonseed, sesame, peanut and linseed oils on addn. of S_2Cl_2 has been measured. All increase in viscosity with increasing amts. of S_2Cl_2. (6.7 g. S_2Cl_2 per 60 cc. oil was the max. tried); olive oil increases from 78.9 centipoises for the oil alone, to 3422.07 for that treated with the max. amt. of S_2Cl_2. Similarly, cottonseed oil increases from 68.02 to 549.60, sesame from 65.02 to 779.72, peanut from 134.20 to 2654.80, linseed from 77.7 to 1651.17. Olive oil shows the greatest increase, 43.3 times, cottonseed the smallest, 8.1. When 10 cc. of any of these oils is added to 90 cc. olive oil they all show very great increases in viscosity, i.e., with cottonseed 4271.58, sesame 4214.04, peanut 4030.38 and linseed 3631.13 centipoises. Thus, even cottonseed has about as much effect as the others. Although olive oil shows the most marked increases in viscosity, pure oleic acid does not gelatinize with S_2Cl_2, whereas the other oils do gelatinize. The viscosity does not vary with the drying properties. All viscosity measurements were made at 20°.

Schrader, Hellmuth

VISCOSITY OF OIL PREPARATIONS.

Pharm. Zentralhalle 75, 689-93(1934); C.A. 29, 628(1935).

By means of the Hoppler viscometer and ultra-thermostat a study has been made on, and values correct with ± 0.001 mm. obtained, with certain oils (camphor, peanut, olive) and emulsions, more particularly related to the requirements of the DAB6.

Sherman, H. C. and Snell, J. F.

HEAT OF COMBUSTION AS A FACTOR IN THE ANALYTICAL EXAMINATION OF OILS; HEATS OF COMBUSTION OF SOME COMMERCIAL OILS.

J. Amer. Chem. Soc., 1901, 23, 164-172; B.A. 1901, ii 430.

A table is given showing the heat of combustion per gram (at constant volume and at constant pressure) of 3 samples of raw and 1 of boiled linseed oil, 1 of poppy-seed oil, 3 of maize oil, 6 of cotton-seed oil, 1 of sesame oil, 3 of rape-seed oil, 2 of castor oil, 1 of peanut oil, 2 of almond oil, 2 of olive oil, 2 of menhaden oil, 2 of codliver oil, 1 of whale oil, 4 of lard oil, 1 of sperm oil, 1 of rosin oil, and 3 samples of lubricating petroleum.

The heats of combustion were determined in the Atwater-Blakeslee bomb. The oil was absorbed on a small piece of fibrous asbestos, and ignited directly by the electrically fused iron wire. The whole operation may be finished within an hour. It was found that the heat of combustion is seriously diminished by exposure and oxidation of the samples, which renders it valuable in the technical analysis of oils in conjunction with the other data usually obtained.

Slansky, Pavel and Kohler, Ludwig.

THE VALIDITY OF THE HAGEN- POISEUILLE EQUATION FOR VEGETABLE OILS.

Kolloid Z. 46, 128-36(1928); C.A. 23, 1295(1929).

A capillary viscometer was constructed that is particularly well suited for the investigation of the flow of highly viscous liquids at low rates of shear. Linseed, hempseed, soybean, sesame, rape, castor, olive and peanut oils were found to deviate from the Hagen-Poiseuille equation at low rates of flow. No difference was found in the flow characteristics of drying and non-drying oils. A 2-phase structure for the vegetable oils is suggested. Wo. Ostwald, V. Trakas and R. Kohler. Ibid 136-44.-Pure mineral oils show no structure viscosity at ordinary rates of flow. Purified vegetable oils show little or no plasticity at room temp. but the effect is marked at 5-7°. Structure viscosity is also found in partially polymerized vegetable oils and in com. mixts. of mineral and vegetable oils. The relation between the radius of the capillary used in the viscometer and the detection of plasticity is discussed.

Steiner, C.

WATER SOLUBILITY AND WASHING OF SULFURIC ACID ESTERS OF UNSATURATED FATS.

Fettchem. Umschau 42, 201-5(1935); C.A. 30, 888(1936).

Castor oil, olein (I), linseed oil (II), oleyl alc. (III) and peanut oil were sulfonated by slowly adding varying amts. of H_2SO_4 to 100-g. portions of the fatty materials held at 28-30°. Except for a few samples of II which were sulfonated with a 92% acid, 98% H_2SO_4 was used. As a general rule, increasing the amt. of H_2SO_4 used caused an increase in organically bound SO_3. This increase, in turn, was paralleled by a tendency for the sulfonated fatty material to form, with hot water, less and less turbid emulsions. Clear solns. were obtained

only with highly sulfonated I and III. The neutralization nos. of the sulfonated fat samples were detd. and their behavior on washing with a 10% Na_2SO_4 soln. was studied.

Suzuki, Bunsuke and Inoue, Yoshiyuki.
ACYL WANDERING AND THE RACEMIZATION OF GLYCERIDES.
Proc. Imp. Acad. (Japan) 6, 71-4(1930); C.A. 24, 4265(1930).
The fact that acyl groups of glycerides may wander is shown by the prepn. of the α, α'-di-p-nitrobenzoyl deriv. from both $ClCH_2CH(OH)CH_2OH$ and $CHCl(CH_2OH)_2$. In the case of tri-glycerides, the only criterion by which change in construction can be detected is optical rotation. α-Phthalyldibenzoylglycerol was converted into its strychnine salt until the const. value of --8.87° was obtained; fractional pptn. of this salt from $CHCl_3$ into 12 fractions gave end values of -30.33° and 9.80°; a further fractionation of each of these into 8 fractions gave end values of -21.21° and 23.25°. In $CHCl_3$ the rotation changes from -25.10° to -8.87° in 121 hrs. α-Phthalylacetone-glycerol gave a strychnine salt with -20.77°; in 12 days this decreased to -10.35°. Rapid prepn. of peanut oil gave a prepn. with $(\alpha)_D$ -0.149, changing to -0.065 in 120 hrs.; a prepn. of castor-bean oil showed a similar change from 1.970° to 1.502° in 268 hrs. Thus the inactivity of the ordinary prepns. of natural fats and oils does not show necessarily that the glycerides preexist in living tissues in the racemized state. It is more probable that the glycerides of non-sym. structure are active but that they lost the activity during the prepn. as well as the preservation.

Thörner, W.
APPARATUS FOR DETERMINING THE EXPANSION OF OILS.
Z. Chem. Apparat., 3, 165-8(Apr. 1); 1 fig.; C.A. 2, 3295(1908).
The change in volume of a known amount of oil for a measured change in temperature is read on the graduated neck of a flask similar to a Babcock milk-testing bottle. The values for a number of fats, oils and other liquids are given.

Unmack, Augusta.
THE USEFULNESS OF THE QUINHYDRONE ELECTRODE FOR WORK WITH EMULSIONS OF FATS.
Kong. Veterinaer-Landsbohjskole Aarskr. 1934, 175-90; Chem. Zentr. 1934, II, 1862-3. C.A. 29, 6781(1935).
According to Söncke Knudsen, cream and skim milk obtained from the same whole milk show different pH values when measurements are made with the quinhydrone electrode but not when measurements are made with the H or glass electrodes. The cause is the unequal distribution of the quinone and hydroquinone between fat and water. The distribution coeffs. at 37° of quinone and hydroquinone, resp., are: for coconut oil 1.98, 0.147; butter fat 1.73, 0.124; peanut oil 1.81, 0.077; linseed oil 1.88, 0.097. A formula is given for calcg. the pH correction.

Verkade, P. E.
ACTION OF MICROORGANISMS ON ORGANIC COMPOUNDS. II. SOLUBILITY OF SOME ORGANIC ACIDS IN FATTY OILS.
Proc. Acad. Sci. Amsterdam 23, 783-9(1921); Verslag. Akad. Wetenschappen Amsterdam 29, 401-8; C.A. 16, 4232(1922); cf. preceding abstr.

The Overton-Meyer lipoid theory contains 2 essential parts, the theory of the selective permeability of the cell wall and the lipoid theory of narcosis. The relative permeability of the cell wall would be detd. by the distribution coeff. of the substance between the "plasma skin fatty substance" and H_2O; in practice the distribution between olive oil-H_2O has been taken, and the assumption made that the two are proportional. Soly. detns. of cinnamic, salicylic and benzoic acids in olive oil, cottonseed oil, coconut oil, linseed oil, castor oil, and 2 samples of peanut oil showed that the soly. of a given acid is different in different samples of the same oil, that the soly. of the acids studied is greatly different in different oils, and that the relative soly. of a given acid in various oils is different. It follows that the soly. of a substance in olive oil is no criterion of its soly. in any other oil, and that the coeff. of distribution olive oil-H_2O need have no relation to the coeff. between the "plasma skin fatty substance" and H_2O.

Wajzer, J.

THE STATIC INTERFACIAL TENSION, AS A FUNCTION OF THE ALKALI CONCENTRATION, IN THE SAPONIFICATION OF AN OIL.

Compt. rend. 200, 1148-50(1935); C.A. 29, 4229(1935).

The interfacial tension of the system aq. NaOH-peanut oil-oleic acid was measured with the duNouy interfacial tensimeter. The breaks in the curve indicate interfacial tensions for oleic acid and peanut oil of 12.8 and 20 dynes, resp. The advantages of the static method are discussed.

Wajzer, Jakob

FURTHER EXPERIMENTS WITH LIPIDES CONSIDERED FROM THE VIEWPOINT OF A THEORY OF THE PHARMACODYNAMIC ACTIONS OF THE ALKALI AND ALKALINE EARTH METAL IONS.

Compt. rend. soc. biol. 120, 707-9(1935); C.A. 30, 1120(1936); cf. C.A. 29, 4229.

In the system aq. iso-AmNH_2-peanut oil-oleic acid the interfacial tension, detd. as in previous work, is 11.6 dynes. The addn. of NaCl and KCl to 0.1 N concn. decreases the interfacial tension to 7.8 and 8.0 dynes, resp., while $CaCl_2$, 0.1 N, increases it to 14.2 dynes. Remarks on the above paper. L. Lapicque. Ibid. 709-10.

Wajzer, J. and Lippmann, R.

INTERFACIAL TENSION OF BLOOD SERUM.

Compt. rend. soc. biol. 122, 922-5(1936); C.A. 30, 8252(1936).

The Lecompte duNouy method was used. The 1st figure is the value for water and the 2nd that for serum in dynes/cm. at pH 6.8-7.0: olive oil 14, 3.6; peanut oil 17, 5.7; liquid petrolatum 40, 20.5; $CHCl_3$ 28, 10.3; PhMe 12, 5.8; CS_2 37, 18.9. Diln. of the serum with 1-4 vols. isotonic NaCl or KCl slightly decreased the interfacial tension while diln. with distd. water or isotonic $CaCl_2$ caused an increase. One sample of liquid petrolatum had an interfacial tension of 18.7 with skim milk, 17.9 with boiled skim milk, 18.2 with whey and 18.2 with skim milk dialyzed 50 hrs.

Wesson, D., and Gaylord, H. P.

SPECIFIC HEAT OF FATS AND OILS

Cotton Oil Press 2, No. 6, 40-41(1918).

Oil	Apparent Sp. heat
Cottonseed	0.503
Peanut	0.500
Soybean	0.492

Badami, Venkata Rao K.
GROUNDNUT(PEANUT), ITS PRODUCTS, COMPOSITION AND USES.
J. Mysore Agr. & Exptl. Union 13, 115-31(1932); C.A. 28, 6212(1934).
Detailed data are given on the chem. compn. of the various parts of the peanut plant and on the compn. and nutritive value of peanut oil, meal and hay. The value of peanut meal as a fertilizer for sugar cane, paddy and the areca palm is discussed.

Channon, H. J. and Drummond, J. C.
THE EFFECT OF GIVING CERTAIN OILS IN THE DAILY DIET OF COWS ON THE COMPOSITION OF BUTTER FAT.
Analyst 49, 311-27(1924); C.A. 18, 2910(1924).
It was desired to know the effect of feeding cod-liver oil on the vitamin-A content of milk and to det. the effect on the compn. of butter fat induced by the inclusion of oils in the daily diet of cows. The duration of the expt. can be divided into 5 periods: 76 days of feeding the basal diet of mangolds, hay and concentrates; 15 days of feeding the basal diet with daily doses of coconut or peanut oil; 32 days of feeding the basal diet alone; 31 days of feeding the basal diet together with castor oil; finally pasture feed to the end of the expt. The yield of milk and of milk fat when plotted showed curves resembling the usual lactation curves of normal animals but there was a definite fall in the fat content when cod-liver oil was fed to the cows. This was made good as soon as the cows were placed in pasture. During the period of oil feeding some of the butter tended to be a bit oily and insipid in taste but there was no evidence of a fishy odor or taste. Feeding of cod-liver oil tends to raise the vitamin-A content. No marked effect, other than an abnormally low m.p. of the butter fat, resulted from the first oil feeding. During the cod-liver oil period the following changes were noticed at the beginning and end: Reichert-Wollney value, 29.6-24.9; saponification value, 237.1-221.3; I_2 value, 26.9-51.4; refractive index, 1.4535-1.4556. During the first period, the amt. of fat in the milk was over twice that in the feed yet when the cod-liver oil amounted to 75% of the fat yield, only about 12% of this oil appeared in the milk. It was hoped by careful fractionation of the methyl or ethyl esters of the fatty acids to obtain more definite information regarding the passage of fatty acids from the food to the milk, particularly with acids which are present in peanut and in cod-liver oil but are normally absent from butter fat but after considerable experimentation it was concluded that the fractionation method of analysis has little or no value as a quant. method of analysis although some American investigators have used it and published values to the third decimal of 1%.

Deuel, Harry J., Jr. and Holmes, Arthur D.
DIGESTIBILITY OF COD-LIVER, JAVA-ALMOND, TEA-SEED AND WATERMELON-SEED OILS, DEER FAT AND SOME BLENDED HYDROGENATED FATS.
U.S. Dept. Agr. Bull. 1033, 1-15(1922); C.A. 16, 3938(1922).
Digestion expts. with blended fats of different m.p. prepd. from corn, cottonseed and peanut oils showed coeffs. of digestibility ranging from 91.5 to 97.4%, excepting in blended cottonseed fat melting at 50° which gave a coeff. of digestibility of 87.0%. Blended fats seem to be as a rule slightly better utilized than the straight hydrogenated oils melting at the same temp. The coeffs. of digestibility found for cod-liver, Java-almond, tea-seed and watermelon-seed oils and deer fat decreased in the order named from 97.7 to 81.7%.

Drummond, Jack Cecil and Coward, Katharine Hope.
Inst. Physiology, Univ. College, London.
RESEARCHES ON THE FAT-SOLUBLE ACCESSORY SUBSTANCE. III. TECHNIC FOR CARRYING OUT FEEDING TESTS FOR VITAMINE A (FAT-SOLUBLE A).
Biochem. J. 14, 661-4(1920(; C.A. 15, 252(1921); cf. C.A. 13, 206.

Many conflicting results in the past can be traced to the use of a basal diet not sufficiently free of vitamin A. The caseinogen is heated for 24 hrs. in shallow dishes to 102°, and then subjected to prolonged and continuous extn. with alc. and ether. Rice starch even in the crude form is almost entirely devoid of fat-sol. A. As source of fat, cottonseed oil may be used. Orange juice and salt mixt., and probably the yeast ext., are devoid of fat-sol. A. D. and C. employ the following basal diet: purified caseinogen 18 parts; purified rice starch 52; refined hydrogenated vegetable oil 15; yeast ext. 5; orange juice 5; salt mixt. 5. There should be no considerable increase of body weight in rats 4-5 weeks old (weighing 50-70 g.) when fed upon this diet. Wherever possible a definite weight of the substance under examn. is administered to the animal before the day's ration of the basal food is given. IV. Nuts as a source of vitamin A. Katharine Hope Coward and Jack Cecil Drummond. Ibid 665-7. - Rats of 50-70 g. wt. were fed on the basal diet described above. The diet was mixed with sufficient cold water to form a stiff paste. Fresh water for drinking and cleaning purposes was supplied daily. The rats were weighed twice a week, and when they had ceased growth and their weight had remained practically stationary for four seccessive weighings, they were fed daily with approx. 1 g. per rat of the nut to be tested. Among the nuts examnd.- Brazil, Barcelona, pea, walnut, almonds and butternuts - not one showed any appreciable amts. of fat-sol. A, and this despite their relatively large content of fat. "These results furnish additional evidence for the theory that vitamin A is formed in the green part of the living plant and is not stored to any appreciable extent as such in the seed and other resting tissues.".

V. THE NUTRITIVE VALUE OF ANIMAL AND VEGETABLE OILS AND FATS CONSIDERED IN RELATION TO THEIR COLOR.
Drummond, Jack Cecil and Coward, Katherine Hope.
Ibid 668-77. -Palmer (C.A. 14, 294), in a criticism of Steenbock's work (C.A. 13, 3220) relating to the association of fat-soluble A with pigment, pointed out that cottonseed oil, supposed to be rich in lipochromes, is destitute of vitamin. D. and C., in amplification of Palmer's work, selected palm oil, which is deeply colored with lipochrome pigments. Young rats, that were in failing health-due to a diet deficient in fat-sol. A- were given a diet containing 20% of a deeply pigmented sample of palm oil. This addition brought about a striking recovery. D. and C. now tried various animal and vegetable oils. The following is a rough approx. extn. of fat-sol. A content, based on butter as 10: Cod-liver oil, 10; dog-body fat, 6-7; beef fat, 6-8; mutton fat, 2; pig fat, 1; lard, 0; horse fat, 6-8; linseed oil, 1-2; hardened linseed oil, 0; palm oil, 3-4; maize oil, 2-3; cottonseed oil, 1; hardened cottonseed oil, 0; peanut oil, 0; olive oil, 0-1. These results show that though inferior to the majority of animal fats, many vegetable oils do contain appreciable quantities of fat-sol. A, which is contrary to earlier finding by various authors. "Our expts. make it clear, however, that unless we accept the suggestion advanced by Steenbock, of the existence of a leuco compd. of the pigment, to account for the exceptions, the theory of the association of yellow pigments of the lipochrome class with the presence of vitamin A fails to hold good." (The authors arrived at this conclusion by extg. the amt. of carotin and xanthophyll in each one of their fat samples and comparing

such results with the corresponding vitamin content. For example, though dog-body fat showed a vitamin content of 6-7, there were no lipochrome pigments (present). Other expts., not related in detail, lead to the belief that "the nutritive value of a fat of animal origin is dependent on the diet of the animal from which it is derived, and that the food value of either animal or vegetable oils and fats may be considerably affected by the methods of prepn. and refining." Preliminary expts. with cows points to the view "that a diet low in vitamin A brings about a distinct fall in the nutritive value of the milk secreted."

Dutta, M. C., Francisco, J. S., Kamal, S, Mackijani, J. K. and Soundararajan, R.
EFFECT OF FEEDING VEGETABLE OILS ON THE FAT CONTENT OF MILK AND ON THE QUALITY OF BUTTER.
Agr. Live-Stock India 7, 503-8(1937); C.A. 32, 2231(1938).

A supplement of peanut and sesame oils to the ordinary dairy ration of cows had no effect on the fat content of the milk. The oils caused a considerable increase in the I-absorption values of the butter and a slightly higher refractometer reading and slightly decreased the carotene content but had no effect on the vitamin A. Cows fed peanut oil produced butter that was greasy and slightly hard but of good taste and a nutty flavor. The butter from those receiving sesame oil was sweet, hard and slightly greasy.

Dyer, Frederick J., Hey, Kathleen M. and Coward, Katharine H.
INFLUENCE OF THE SOLVENT ON THE VITAMIN A ACTIVITY OF (A) CAROTENE AND (B) COD-LIVER OIL.
Biochem. J. 28, 875-81(1934); C.A. 28, 6789(1934).

A soln. of the International Standard for vitamin A in peanut oil had 5-6 times the potency of solns. in hardened cottonseed oil and Lt laurate, though made of the same strength. An estn. of the vitamin A sample of D-carotene showed that it had about 175% of the vitamin A potency of the International Standard.

Euler, Hans v. and Ahlstrom, Lucie
THE OXIDATION CAPACITY OF SUBSTANCES CONTAINING VITAMIN A.
Z. physiol. Chem. 204, 168-80(1932); C.A. 26, 3006(1932).

A comparison was made at the C. L. C. units as detd. by the Carr-Price $SbCl_3$ reaction, the growth-promoting activity for albino rats and the O consumption in the Warburg app., of peanut oil, petroleum ether exts. of the livers of codfish, spiny dogfish, mackerel and turbot, vitamin A prepns. from mackerel liver and halibut liver, and dihydrocarotene. In general the liver oils show a high oxidation capacity in terms of O consumption per mg. substance per hr., especially in those oils which give a strong $SbCl_3$ reaction and show a high degree of growth-promoting activity. The oxidation capacity is still greater in the highly potent vitamin A prepns. from the fish oils. An exptl. basis is thus furnished for the assumption that vitamin A plays a chem. role closely related to oxidation processes. Blood, and especially the constituents of the red cells, increase the activity of vitamin A in the animal body. This was shown by a 2-3-fold increase in oxidation capacity of thin sections of rat liver placed in serum and blood as compared to controls in Ringer soln. when correction was made for the oxidation of the blood itself. In the same manner a dil. soln. of hemin greatly increased the oxidation of cod-liver oil. An inverse relationship appears to exist between oxidation capacity and catalase content.

Euler, Hans v., Myrbäck, Karl, Fink, Hermann and Hellström, Harry.
GROWTH FACTORS. X.
Z. physiol. Chem. 168, 11-26(1927); cf. C.A. 21, 117; C.A. 21, 3071(1927)

Spectrophotometric measurements of the absorption spectrum obtained after treating codliver oil of normal growth-promoting action with $AsCl_3$ or $SbCl_3$ differ essentially from those obtained with similarly treated irradiated oils, e. g., peanut oil, of equal growth-promoting action. Insofar as these color reactions are dependent on the presence of a vitamin or growth-promoting factor, the potency of cod-liver oil and that of irradiated peanut oil cannot be attributed to the same factor.

Euler, Hans v., Myrbäck, Karl and Karlsson, Signe.
COLORIMETRIC INVESTIGATION OF OILS CONTAINING A AND 1D (VITAMINS) AND OILS IRRADIATED BY ULTRA-VIOLET.
Z. physiol. Chem. 157, 263-82(1926); C.A. 21, 117(1927).

Cholesterol after irradiation by ultra-violet rays no longer melts sharply at 146° but over a range of about 20°. At the same time some of its color reactions become negative, especially those of Whitby(Ac_2O and HNO_3, also H_2SO_4, CH_2O and Ac_2O). The Fearon reaction of cod-liver oil (rose color with pyrogallol and CCl_3CO_2H) is not obtained with cholesterol, cholesteryl acetate or sitosterol even after the addn. of Bz_2O_2. Peanut oil before irradiation gave no reaction, and after irradiation and development of A and 1D potency it gave a yellow to brown color which was not the characteristic Fearon reaction. Cod-liver oil samples which require addn. of Bz_2O_2 to give the reaction were found to respond without Bz_2O_2 if allowed to oxidize in the air for several days. The presence of an oxidizing substance in the reacting samples may be shown by the blue color with starch KI. The Fearon color reaction is still more characteristic when exam. spectrographically. Cod-liver oil shows a distinct absorption in the orange, a strong absorption in the green, and less strong in the blue and violet. Peanut oil, on the other hand, gives a strong absorption in the blue and violet, whether treated with Bz_2O_2 or irradiated. The characteristic color obtained with cod-liver oil is not affected by the presence of $CHCl_3$, C_6H_6 or CS_2, but is suppressed by EtOH, EtOAc or AcOH. Other oils, e.g., peanut oil, even in comparatively large amts., do not interfere with the color reaction. The presence of H_2O also has little or no effect.

Euler, Hans v. and Rydbom, Margareta
GROWTH FACTORS. IX.
Z. physiol. Chem. 157, 163-70(1926); cf. C.A. 20, 3487; C.A. 21, 117(1927)

The addn. of cholesterol to the ration of rats receiving meat in sufficient amt. to correct a slight deficiency in vitamins A and 1D supplied in the form of cod-liver oil accelerates growth if given in comparatively large doses. Addns. of 0.1 g. cholesterol to the basal ration of young rats can be tolerated for months without the development of any noticeable anomalies. After ultra-violet irradiation of a rat receiving cholesterol the post-mortem showed a complete absence of any rachitic smyptoms, while the non-irradiated control animal showed some slight indications. Feeding of irradiated peanut oil in excessive amts. (80 X the 1D requirement) resulted in a striking gain, without noticeable anomalies, as in the expts. previously reported with overdosage of cod-liver oil.

Euler, Hans v., Tidell, Henry and Eriksen, Elsa.
GROWTH FACTORS. III.
Z. physiol. Chem. 144, 123-31(1925); C.A. 19, 2513(1925); cf. C.A. 19, 1711

A basal ration of 20% vitamin-free casein, 50% starch, 15% hardened peanut oil and 5% McCollum's salt mixt. was fed ad libitum to young white rats until an equil. in wt. was established. Then 1 g. of the substance to be tested was irradiated by a quartz-Hg lamp and administered daily. No further growth was obtained with irradiated H_2O, casein, hardened peanut oil or stearic acid, whereas growth was resumed by feeding irradiated peanut oil and oleic acid. The capacity for activation is probably a function of the unsatn. in the fatty acid. The $CHCl_3$-sol. pigment formed by treating cod-liver oil with concd. H_2SO_4 and often considered a measure of vitamin potency is not obtained with activated peanut oil. The irradiated oil exhibits not only a growth-promoting power but also antirachitic and bacterial activity probably associated with the $Ca-PO_4$ exchange.

Goettsch, Marianne and Pappenheimer, Alwin M.
THE PREVENTION OF NUTRITIONAL ENCEPHALOMALACIA IN CHICKS BY VEGETABLE OILS AND THEIR FRACTIONS.
J. Biol. Chem. 114, 673-87(1936); C.A. 30, 6427(1936).

Certain edible oils (corn oil, cottonseed oil, hydrogenated cottonseed oil, peanut oil and soybean oil) when added to a causative diet provide a protective factor against nutritional encephalomalacia of chicks. This disease is not thought to be a manifestation of vitamin E deficiency since the addn. of natural foodstuffs rich in vitamin E does not protect the chicks. Cabbage, alfalfa-leaf meal, meat scraps and fresh beef liver exert no beneficial effect, while grains and grain products, lettuce, spinach, grass, egg yolk and calf brain provide only partial protection or yielded inconstant results. On diets low in lard content the incidence is decreased, however, with complete elimination of lard from the diet the disease still appeared. The protective factor, found in the edible oils, can be partially extd. by 95% alc., it is the thermostable, resistant to aeration and ultraviolet irradiation, and is present in the nonsaponifiable fraction of the oil if due precaution is taken against oxidation during sapon. The fatty acid and water-sol. fractions are inert.

Hartwell, Gladys A.
A NOTE ON THE DIGESTION OF FATS BY PANCREATIC LIPASE.
Biochem. J. 32, 462-6(1938); C.A. 32, 5459(1938).

Emulsions of the fats in milk were prepd. and their rates of digestion were compared with those of a cream prepd. similarly from butter. Coconut oil was digested more rapidly by pancreatic lipase than any other fat. Palm-kernel oil and castor oil were digested more rapidly than butter, while almond oil, peanut oil, bacon fat, beef fat, beef oleo, beef stearin, cocoa butter, cod-liver oil, cottonseed oil, lard, mutton fat, olive oil, palm oil, premier jus, soybean oil, hardened whale oil and hardened peanut oil were digested more slowly and at about the same rate.

Holmes, A. D. and Deuel, H. J., Jr., Office Home Economics, U. S. Dept. of Agr.
DIGESTIBILITY OF SOME HYDROGENATED OILS.
Am. J. Physiol. 54, 479-88(1921); C.A. 15, 2113(1921).

Corn oil, cottonseed oil and peanut oil were hardened to varying degrees by hydrogenation and the digestibility by man of the resulting fats was detd. Digestibility coeffs. for hardened cottonseed oil m. 35°, 38.6° and 46° were resp., 96.8, 95.5 and 94.9%. For hydrogenated peanut oil m. 37°, 39°, 43°, 50° and 52.4° the digestibility coeffs. were 98.1, 95.9, 96.6, 92.0 and 79.0%. For hardened corn oil m. 33°, 43°, and 50° the coeffs. were 94.7, 95.4 and 88.5%. In general digestibility decreased as m.p. increased. All the fats melting below 46° were well utilized.

Holmes, Arthur D., Pigott, Madeleine G., and Bowser, Lawrence P.
THE VALUE OF COD-LIVER OIL IN THE TREATMENT OF ANEMIA.
New Engl. J. Med. 209, 839-42(1933); C. A. 28, 1080(1934).

The administration of cod-liver oil alone does not appear to promote blood regeneration in anemic rats. Rats maintained on daily rations contg. 0.5 mg. of Fe and 0.05 mg. of Cu in addn. to cod-liver oil supplements show a somewhat more rapid rate of blood regeneration than rats receiving Fe and Cu without cod-liver oil. However, when the quantity of Fe administered is increased to 1.5, 2.5, or 3.0 mg., the rate of hemoglobin increase does not differ from that of the controls. Similar results are obtained when peanut oil free from vitamin A is substituted for cod-liver oil.

Koehne, Martha and Mendel, Lafayette B.
UTILIZATION OF FATTY OILS GIVEN PARENTERALLY.
J. Nutrition 1, 399-443(1929); C. A. 23, 3955(1929).

Coconut, peanut butter and cod-liver oils, when injected parenterally into albino rats and dogs, were utilized only to a very slight degree if at all. The metabolism of the oils is extremely slow and is surely not a dependable source of energy to animals. Coconut oil was better tolerated than the rest and seemed to have a definite though sparing effect upon protein catabolism. Starvation had little influence in forcing the utilization of oils by the exptl. animals. Both vitamins A and D in cod-liver oil can be utilized by young rats when administered parenterally; the vitamins of butter oil could not be so utilized. The dog is unable to utilize peanut oil. The utilization or non-utilization of fat-sol. vitamins A and D and Sudan III present in an oil at the time of its injection cannot be regarded as proof of the utilization or non-utilization of the oil which held it in soln. Fats administered parenterally are too slowly metabolized to exert a sufficient influence on N catabolism to make this method of evaluation practicable. A bibliography of 44 references is appended.

Langworthy, C. F. and Holmes, A. D.
DIGESTIBILITY OF SOME VEGETABLE FATS
U. S. Dept. Agr., Bull. 505, 19 pp.(1917); C. A. 11, 1215(1917).

Digestion expts. with olive, cottonseed, peanut, coconut, and sesame oils and cacao butter were carried out by the same methods used in the previous work on animal fats (C. A. 10, 625). With allowance for metabolic products, the coeffs. of digestibility were found to be, for olive oil, 97.8; for cottonseed, 97.8; for peanut, 98.3; for coconut, 97.9; for sesame, 98; and for cacao butter 94.9%. With the exception of cacao butter, the vegetable fats are all utilized as completely as the animal fats. They are all, except cacao butter, utilized practically completely by the body.

The av. amts. eaten per subject per day were: 73 g. of olive, 86 g. of cottonseed, 98 g. of peanut, 64 g. of coconut, and 90 g. of sesame oil. With cacao butter, when a daily av. of 51 g. were eaten, no abnormal conditions were noted, but with 82 to 138 g. only 86.5% was utilized, and there was a laxative effect. The av. total energy value of the material consumed per man per day was, for olive, 2700; for cottonseed, 2955; for peanut, 2290; for coconut, 2305; for sesame, 2975; and for cacao butter, 2215 cals. The % of energy actually available to the body was, for olive oil, 93.9; for cottonseed, 93.4; for peanut, 93.9; for coconut, 93.1; for sesame, 92.8; and for cacao butter, 91.9.

Lassen, K. Krieger.
THE INFLUENCE OF BUTTER FAT AND PEANUT OIL ON THE GROWTH AND FERTILITY OF RATS.
Acta Path. Microbiol. Scand. 11, 183-96(1934); C.A. 29, 4801(1935).

Peanut oil is a satisfactory substitute for butter fat in the diets of rats, provided cod-liver oil is added as a source of vitamins A and D. Peanut oil does not reduce the fertility of rats, whereas butter fat counteracts it in females and reduces it in males.

McAmis, Ava J., Anderson, Wm. E. and Mendel, Lafayette B.
GROWTH OF RATS ON "FAT-FREE" DIETS.
J. Biol. Chem., 82, 247-62(1929). C.A. 23, 3957(1929).

"In order to study the compn. of body fat yielded by an animal grown under a dietary regime in which there was no ingested fat, a diet of extremely low fat content (consisting of extd. casein, sucrose, Osborne and Mendel salt mixt., yeast concentrate, cod-liver oil concentrate, irradiated ergosterol, and hot H_2O ext. of liver) was fed to albino rats. Comparatively good, though by no means optimal, growth has been recorded for these animals. The best growth, however, was exemplified by those animals which received small inclusions of fat (1 drop each of cod-liver oil and peanut oil) in their diet. Whether this apparent beneficial effect of a small quantity of fat is due to its content of vitamin A or other vitamins, or to its action as a vehicle for the fat-sol. vitamins, or whether fat per se is essential, is not conclusively demonstrated."

McCay, C. M. and Paul, Henry.
EFFECT OF MELTING POINT OF FAT ON ITS UTILIZATION BY GUINEA PIGS.
J. Nutrition 15, 377-82(1938); C.A. 32, 7527(1938).

The following oils were fed guinea pigs, the oils being incorporated at a 6% level in a diet of alfalfa hay and grain which has been previously extd. with isopropyl ether: castor, soybean, olive, coconut, salmon, cod-liver, neatsfoot, peanut, butter, cottonseed, hydrogenated cottonseed, corn, tallow and lard. The fecal lipide was much higher after feeding the higher melting fats. The higher melting fats are not so well utilized as the oils by the guinea pigs in contrast to the rat. Castor oil is well absorbed.

Morgen, A., Beger, C. and Westhausser, F.
THE INFLUENCE OF PROTEIN ON MILK PRODUCTION, THE RELATION BETWEEN ENERGY VALUE AND MILK YIELD.
Konigl. Wurttlandw. Versstat. Hohenheim. Landw. Vers. Stat., 66, 63-165; C.A. 2, 1309(1908).

The plan of Expt. (1) was to add increasing amounts of protein to a ration which had a low, medium, normal and high fat content. In Exp't (2) the same amount of protein was present in rations of varying fat content. The foods used were straw, dried beet pulp, peanut oil, dry gluten and tropon residues. Ten sheep and one goat served for the experiments. The results showed that high protein feeds of low fat content reduced the quality of the milk both in per cent. of fat and of dry substance. The yield of milk was, however, greater, as was likewise the per cent. of nitrogen and sugar. The absolute amounts of fat and dry matter are decreased in the case where the ration contains a minimum amount of fat; where the ration contains a normal or large amount of fat, the absolute amount of every milk constituent is increased by the increase of protein in the food. On the other hand, with a ration containing a normal amount of protein, the increase in fat generally produces an increase in yield and of the various milk constituents. The fat of the food influences the physical character of the milk fat; the protein of the food does not. The refractive index of the milk fat is raised or lowered by a high of low fat content of the ration. Rations of equal energy value give the same yield only when sufficient fat and protein are present. A protein-rich ration of low energy value gives a higher yield than a protein-poor ration of high energy value.

Rondoni, Pietro
IRRADIATION OF FOODS WITH ULTRA-VIOLET RAYS, AND THE ANTIRACHITIC VITAMIN. PEANUT OIL.
Sperimentale 30, 443-63(1926); C.A. 21, 761(1927).
Even short exposures (not > 0.5 hr.) of peanut oil increase its antirachitic and Ca-fixing properties in young rats on a rickets-producing diet. Irradiation also increases the protection afforded by peanut oil against diets insufficient for growth or maintenance.

Rose, E.
THE HEALTHFULNESS OF HYDROGENATED FATS FOR FOOD PURPOSES. EXPERIMENTS WITH COTTONSEED, PEANUT, LINSEED AND SESAME OILS.
Arb. Reichsgesundheitsamte 52, 184-209(1920); C.A. 15, 905(1921).
These oils were found to be free from As and Ni and harmless.

Rosedale, J. L. and Oliveiro, C. J.
NUTRITIONAL PROPERTIES OF RED PALM OIL.
Malayan Med. J. 9, 140-5(1934); C.A. 30, 4230(1936); cf. C.A. 30, 1453.
Lard and earthnut, gingelly and coconut oils contain little or no vitamin A. Red palm oil (0.05% of the diet being the min. prophylactic dose) and king ray, shark and carp oils are good sources of the vitamin. Coconut, earthnut, gingelly, red palm and olive oils contain no vitamin D, but are activated by direct sunlight, exposure for short periods daily causing complete healing of rickets in rats (red palm oil least effective). Red palm oil, in doses of about 50 mg. daily, is effective in promoting growth and preventing or healing xerophthalmia in rats. Heating at 140-160° for 30 min. leaves a substantial fraction of the activity intact, but higher temp. (220°) causes complete inactivation.

Simonnet, H.

SIMPLE DIETS DEFICIENT IN THE FAT-SOLUBLE FACTOR A.

Bull. soc. chim. biol. 5, 739-47(1923); C.A. 18, 1319(1924); cf. C.A. 15, 2883, 3114.

The basic diet fed rats consisted of 20 parts of pancreatic peptone from muscle, 74 of sucrose, 4 of Osborne's and Mendel's salt mixture and 2 of agar-agar. Addn. of yeast ext. provided D. Curves are given showing that with such a diet arrest of growth and xerophthalmia are easily obtained. With this diet it is easily demonstrated that cod-liver oil has preventive action, coalfish oil curative, peanut oil less preventive and no curative action.

Sure, Barnett.

DIETARY REQUIREMENTS FOR FERTILITY AND LACTATION. I. THE ROLE OF FAT-SOLUBLE VITAMINS IN FERTILITY AND LACTATION.

Ark. Agr. Expt. Sta., Bull. 250, 67 pp.(1930); C.A. 24, 5538(1930); cf. C.A. 23, 1941, 3957, 3491, 1159.

A compilation and recapitulation of the author's studies with some new data and interpretations. Lack of fertility in young albino rats could not be assocd. with lack of proteins but was attributed to lack of vitamin E. Evidence is presented showing that the Et_2O exts. of yellow corn, wheat embryo and hemp seed contain an org. factor necessary for reproduction. Fertility was also secured with com. cottonseed oil and olive oil but not with sesame, coconut or linseed oils. The requirement of vitamin E for normal mammary gland function is much greater than that for growth. Skimmed milk powder, fortified with 0.2% Fe citrate and fed at a 50% plane of intake, furnished sufficient mineral elements of excellent quality for reproduction. Of all the vegetable and fruit oils studied, wheat oil, cottonseed oil, corn oil and palm oil were the only ones that permitted significant success in lactation and exhibited antisterility properties. Wheat oil was most potent. Peanut, soybean, olive and peach-kernel oils cured sterility but were non-potent for lactation. Vitamin E deficiency in the female albino rats is characterized by resorption of the fetus during gestation, as detd. by the pregnancy curve, and as shown by postmortem exam. of the uterine horns. Vitamin E is contained in the unsaponifiable portion of wheat or cottonseed oils. Vitamin E may be composed of 2 factors: (1) a fat-sol. vitamin essential to fertility and (2) a fat-sol. vitamin essential to the promotion of lactation. The addn. of wheat oil subjected to high temps. and oxidation, when added to a skimmed milk powder sterility diet, produced a more serious effect on lactation than on fertility. The perioxides of wheat oil formed during aeration probably caused the injurious effects. Cod-liver oil was found to be deficient in vitamin E, though contg. an abundant amt. of other vitamins. The same cod-liver oil administered to animals in excessive amts., in addn. to a highly purified diet contg. 5% Harris yeast, was followed by toxic effects on growing animals, especially after mating. The criterion for potency of the antisterility factor must be continuous fertility. Butter fat does not approximate the potency of wheat oil as a source of vitamin E. Ten % butter fat added to a synthetic reproduction-deficient diet insured successful and continuous fertility and lactation. The importance of small quantities of milk fat for fertility

is emphasized. One of the limiting factors in all milk diets studied from the standpoint of lactation was vitamin E. Sterility, characterized by resorption of the fetus during gestation and assocd. with vitamin A deficiency, was produced in rats on a skimmed milk powder diet contg. an abundance of vitamin E. On the basis of research completed to date, no conclusive evidence is available for the existence of a sp. fat-sol. lactation-promoting vitamin, and vitamin E must be considered exclusively as an antisterility vitamin. The historical background relative to the discovery of vitamin E is reviewed. Eighty references are appended.

Ueno, Sei-Ichi; Ota, Yasuo; Yokoyama, Shigeru and Koizumi, Kaoru.
NUTRITIVE VALUE OF HARDENED OILS. IV. NUTRITIVE VALUE OF HARDENED COCONUT OIL AND SOME VEGETABLE OILS.
J. Soc. Chem. Ind. Japan, 34, Suppl. binding 132-3(1931); C.A. 25, 4590(1931). cf. C.A. 24, 3042.

Albino rats were fed the following diet: rice starch 69, cane sugar 5, fat-free horse flesh 10, McCollum and Simmonds No. 185 salt mixt. 5, oryzanin powder 1, and oil (hydrogenated below 120°) 10 parts, (soybean, peanut, coconut, Mazola salad or Getz salad oil). The hardened coconut oil was inferior to the original oil in the increase of body wt. and maintenance of health. The oils rich in carotene except soybean gave good results.

Ueno, S., Yamashita, M., Ota, Y. and Okamura, Z.
NUTRITIVE VALUE OF HYDROGENATED OILS.
J. Soc. Chem. Ind. (Japan) 30, 378-85(1927); C.A. 22, 804(1928).

The authors intended to ascertain whether or not the oils retained their nutritive value when they had been submitted to hydrogenation under the condition which would be suitable for retaining vitamin A. The oils tested were olive oil, cottonseed oil, cod-liver oil, peanut oil, soybean oil, sesame oil and deodorized coconut oil. Each sample of these oils was divided into 2 parts, a part was kept for the control and the other was hydrogenated at 120° and the nutritive value of the latter was compared with that of the former. The hardened oil gave the superior result, due to the fact that it consists chiefly of the glycerides of the satd. acids and of the oleic acid series, which are stable to light and air, and also that some toxins are eliminated during purification and hydrogenation. Conclusion: The hydrogenated oils are very excellent as edible fats.

Andrews, Thomas.
HARDENED-FAT MANUFACTURE-OIL IMPURITIES AS CATALYTIC POISONS.
Chem. Trade J. 84, 277-8, 302-3, 351-2, 369-70(1929); C.A. 24, 1530(1928)

A set of expts. was conducted to see whether it is possible to hydrogenate crude oils, and what it is that is liable to cause trouble. A standard Ni catalyst, a const. supply of H_2 of known purity, and an oil having no marked effect on the catalyst, and which would remain const. in its absorption over long periods, were secured for the expts. Electrolytic H_2 of 99.95% purity and peanut oil were used. The substances investigated were: (1) the unsaponifiable matter in fish oil. (2) the foots obtained by freezing out (demarginating) fish oils, (3) P, which is present in oils either in some form of lecithin or as Ca phosphate, (4) S, often present as SCN, (5) blood, which is commonly present in the "body" oils from fish, and (6) nitrogeneous matter, which is commonly present in all oils. The poison was mixed with the standard oil in a proportion approximating that in a very poor crude oil. The unsaponifiable matter in a very low-grade cod-liver oil caused a marked falling off in activity, while org. P had little effect. When S in an org. compd. is in a position to react with the H_2, a marked effect results. Blood had a marked poisoning effect, while nitrogeneous material such as isinglass apparently has an effect more phys. than chem.

Athavale, V. T. and Jatkar, S. K. K.
HYDROGENATION OF OILS BY THE CONTINUOUS PROCESS. I. HYDROGENATION OF GROUNDNUT OIL BY CATALYSTS OF NICKEL AND ITS ALLOYS.
J. Indian Inst. Sci., 20A, 95-109(1937); C.A. 32, 3647(1938).

The hydrogenation of groundnut oil by various catalysts prepd. from Ni wire and its alloys has been studied by the continuous flow method and it has been shown that the Ni wire catalyst is the easiest to be prepd. in a high state of activity. Life tests of this catalyst showed a sudden fall in the activity to 60% of its original value after 5 days continuous run. The activity of monel is equal to that of Ni, but more difficult to reactivate. Ferry wire (Ni: Cu: : 54 : 46) showed a considerably lower activity. Raney's catalyst did not give promising results. Velocity coeffs. of the hydrogenation reaction for the different catalysts were calcd. on the basis of a unimol. formula. Concordant results for different times of contact were obtained only with Ni wires. Above 140° these velocity coeffs. are the same; with monel, however, they show considerable variation with different rates; the velocity at higher rates at 160° and 180° is much higher than with Ni wire.

Athavale, V. T. and Jatkar, S. K. K.
HYDROGENATION OF OILS BY THE CONTINUOUS PROCESS. IV. KINETICS OF THE HYDROGENATION OF GROUND-NUT OIL BY PRECIPITATED NICKEL CATALYSTS.
J. Indian Inst. Sci. 21A, 307-19(1938); C.A. 33, 6628(1939).

The velocity coeffs. for the hydrogenation of ground-nut oil by $NiCO_3$-kieselguhr, unsupported $NiCO_3$, Ni-silica gel and Ni peroxide-kieselguhr catalysts were studied and the results compared with those of the same oil hydrogenated with Ni-wire catalyst. The velocity coeffs. of the reaction were calcd. by the formula $K = (2.3/t)\log [a/(a - x)]$ which gave concordant values for K in the case of Ni-silica

gel catalyst at 100°, 160° and 200° as in the case of Ni-wire catalyst. With other catalysts and oils the values differed with rates of flow over the catalyst. The temp. coeff. of the corrected velocity K' showed that the rate of reaction was high at 2 temps.--150° and above 200°, the high reaction velocity at the former temp. being selective toward the hydrogenation of olein, in agreement with the results of expts. on the hydrogenation of olive and cottonseed oils and Et oleate.

Bailey, H. S. and Allen, J. H.
THE OIL SATURATION VALUE OF BLEACHING EARTHS AND CARBONS.
Cotton Oil Press 7, No. 8, 36-7(Dec. 1923); C.A. 18, 337(1924).

A slight modification of the oil absorption test for pigments proposed by Gardner (C.A. 14, 1446) has been found helpful in detg. the relative oil retention of bleaching earths and carbons. This value as detd. in the lab. is not the same as the loss experienced in the plant process of bleaching but gives a good indication of the amt. of loss which may be expected with different bleaching materials. Figures given of the oil satn. values of various domestic and foreign earths with coconut, peanut and cottonseed oils indicate that there is little difference in the bleach losses with similar vegetable oils. Boneblack has about the same satn. value as fuller's earth but with vegetable chars the oil retained is 2-4 times as great.

Barninger, O.
THE HYDROGENATION OF FATTY OILS AND THE MANUFACTURE OF HARDENED EDIBLE FATS.
Schweiz. Chem.-Ztg. 1921, 1-11; C.A. 15, 1227(1921).

An address before the 10th annual convention of the Swiss Food Inspectors. A semi-technical discourse on the compn. of animal and vegetable oils and the history of contact catalysis, followed by a brief description of the pressing, refining, and hardening of edible oils and the manuf. of H. A table of "Constants" of peanut, sesame, cottonseed, fish, linseed, soybean, corn and castor oils before and after hardening is given.

Bauer, K. H. and Herzog, W.
THE FORMATION OF ISO(OLEIC) ACIDS DURING FAT HARDENING.
Fette u. Seifen. 46, 203-6(1939); C.A. 33, 7134(1939).

Exptl. evidence shows that at higher temps. partial hydrogenation of poly-unsatd. fat acid radicals is accompanied by wandering and elaidinization of double bonds. The partial hydrogenation of peanut oil, contg. linoleic acid (I) as glyceride, with Ni catalyst resulted in formation, at 100°, of a liquid 12-13 octadecenic acid (II) and, at 200°, of a solid 12-13 octadecenic acid (III) together with smaller amts. of unidentified further isomers of oleic acid probably formed by migration of double bonds under the influence of the high temp. Since I prepd. by debromination of its tetrabromide yields III on partial hydrogenation at lower temps., it seems likely that III is the elaidinized form of II and that the configuration of the 12-13 double bond in I is different depending on whether I is derived directly from naturally occurring sources or prepd. from its tetrabromide.

Bauer, K. H. and Mitsotakis, J. (Univ. Leipzig)
ISOOLEIC ACIDS.
Chem. Umschau Fette, Oele, Wachse u. Harze 35, 137-9(1928); C.A. 22, 3133(1928)

Isooleic acids may have their double C bond between any C atoms except at the 9,10-position, which is reserved for the normal acid. They are solid at room temp. Unsuccessful attempts to isolate isooleic acid from the solid acids after hydrogenating peanut oil, caused B. and M. to ozonize the liberated mixed acids, then to ext. the free acids and acid esters of the di-CO_2H acids with dil. Na_2CO_3, liberate the acids with the H_2SO_4 and distil them finally with steam. They obtained a decamethylenedicarboxylic acid m. 123-4°, identified by ultimate analysis; also a small quantity of azelaic acid m. 106°, and the volatile caproic acid, identified by b.p., sapon. no., ultimate analysis and analysis of its Zn salt. These products point to the presence of 12,13-isooleic acid and this acid probably resulted from the satn. of the 9,10-double bond in linolic acid, leaving the 12,13 double bond intact.

Bedford, F. and Williams, C. E.
TREATING EARTH-NUT OIL.
Swiss, 63,930, Dec. 18, 1911; C.A. 8, P2274(1914).

Treating earth-nut oil, as specified in 63,931.

Bloemen, Frans.
THEORY OF THE HYDROGENATION OF VEGETABLE OILS. II.
Fettchem. Umschau 41, 151-4(1934); C.A. 28, 7568(1934); cf. C.A. 28,4926.

Strictly speaking the laws of equil. as previously formulated apply only to the hypothetical case that all the fat mols. are subject to a catalytic influence of uniform intensity. This condition is never met practically, due to the limited sphere of influence of each catalyst particle and to the fact that the intensity of catalytic action is greatest at or very near the surface of the catalyst particles. These considerations both explain why previously drawn conclusions as to the effect of temp. and pressure on the course of hydrogenation are of qual. rather than quant. nature, and also offer a theoretical explanation of the known importance of controlling the amt. of catalyst as a means of influencing the degree of selectivity of hydrogenation. A uniform soft fat can be prepd. from certain oils, e.g., peanut oil, by hydrogenating under such conditions as to favor formation of glycerides of the desired consistency contg. isooleic acid residues. Certain other oils, e.g., linseed oil, do not yield satisfactory soft fats due perhaps to the formation of glycerides which contain residues of other isooleic acids and which are too soft and semi-fluid.

Burman, M. M.
HARDENING OILS AND FATS.
Brit. 309,502, April 11, 1928; C.A. 24, P 744(1930).

Products such as lard, tallow, coconut oil, peanut oil or ghee are admixed with a suitable proportion of a hydrogenated product of similar character to give a desired m.p. the mixt. is homogenized while heated and is suddenly chilled to below the solidification point.

Chemisches Laboratorium C. Stiepel.
SEPARATING FAT ACIDS.
Ger. 625,577, Feb. 12, 1936(Cl. 23d. 1); C.A. 30, P 5064(1936).

Solid and liquid fat acids are sepd. from their mixts. by pptg. the solid acids as metal soaps of low soly. Thus, peanut-oil fat acid is dissolved in alc. and $Ca(OH)_2$ is added. After boiling for a short time, the solid fat acid present is pptd. as Ca soap which is sepd. The liquid acid is then obtained by evapg. the alc. Other examples are given.

Chowdhury, Jogendra Kumar and Das, Surendra Chandra.
DECOLORIZATION OF OILS WITH MIXED ADSORBENTS.
J. Indian Chem. Soc. 7, 379-400(1930); C.A. 24, 5565(1930).

The efficiency of different adsorbents in removing the color from colored kerosene and from groundnut oils was detd. The decrease in the intensity of both the yellow and the red coloration was measured by a Lovibond tintometer. The adsorbents tested included bauxite-Al_2O_3, Al_2O_3-SiO_2 & C-Al_2O_3. Bone charcoal & the two-component adsorbents were much superior to bauxite, Al_2O_3 or SiO_2. The adsorption isotherms for any one color follow the Freundlich adsorption isotherm. Unlike general adsorptive phenomena, however, the values of 1/n in the usual equation were greater than unity. The relative activity of two-component mixts. contg. different relative amts. of the two constituents were detd. as a function of the compn. All such two-component adsorbents were either co-pptd. or consisted of one component pptd. upon a suspension of fine particles of the other. With increasing Al_2O_3 content, the efficiency of 2 g. samples of Al_2O_3-SiO_2 adsorbents toward the red color in 100 cc. of the colored kerosene increased from a few % color removal on pure Al_2O_3 to a max. of 60% on a sample contg. 16.67% Al_2O_3, decreasing then to a 10% efficiency on pure SiO_2. Each of the similar curves for bauxite-SiO_2 showed a max. at 21.88% SiO_2. The position of the max. was in every instance independent of the material being decolorized or of the color being measured. The efficiency of C-Al_2O_3 adsorbents remained const. as Al_2O_3 increased from 0 to about 30%, and then decreased to the value for pure Al_2O_3. Adsorbents heated only to such temps. as would leave 4-6% water in them were more effective than highly heated and completely dehydrated ones. Spent adsorbents can be regenerated almost completely by the usual steam-air treatment. A tentative explanation of the superiority of mixed adsorbents to either of the similarly prepd. pure constituents is that the opposite walls of the tiny capillaries are oppositely charged when 2 constituents are present, thus creating a polarizing elec. field that markedly influences the adsorptive capacity of the capillaries.

Escourrou, Rene.
CATALYTIC HYDROGENATION UNDER REDUCED PRESSURE. I. HYDROGENATION OF PEANUT OIL AND p-TOLUQUINOLINE AT REDUCED PRESSURE.
Bull. soc. chim. (5), 5, 1184-1200(1938); C.A. 32, 9533(1938).

The app. used previously was slightly modified. In peanut oil the linoleic acid is changed to oleic acid when Raney Ni mounted on pumice is used as a catalyst. The hydrogenation stops at this stage. This offers a practical method of removing the impurities or easily oxidizable constituents from the oil which produce odor and rancidity. From p-toluquinoline there may be formed at will 6-methyl-1,2,3,4,-tetrahydroquinoline or 6-methyldecahydroquinoline. This was done in the gas phase, with Raney Ni, Pt and Ag mounted on pumice. With Ag the product could be heated to 400° without the least decompn.

Escourrou, Rene

SELECTIVE HYDROGENATION OF PEANUT OIL AND ITS FAT ACIDS UNDER REDUCED PRESSURE. III.

Bull. soc. chim. (5), 6, 360-7(1939); cf. C.A. 32, 9533: C.A. 33, 4068 (1939).

Fat acids from peanut oil are selectively hydrogenated under reduced pressure (20 mm.) at 180° in EtOH-Et_2O soln. in the presence of Raney Ni. Under these conditions the I no. of the fat acids drops from 92 to 73 and seems to stop at this point with the formation of chiefly isooleic acid. At ordinary pressure partially hydrogenated fat acids with an I no. of 38, m. 42-3°, are obtained with stearic acid predominating. Hydrogenation of peanut oil under similar conditions to those described above confirms earlier expts. (C.A. 32, 9533). It is therefore possible to harden peanut oil by partial hydrogenation and by directing the fixation of H in such a way as to form isooleic acid. In a 2nd series of expts. the fat acids are sepd. via their Me esters and detd. It is found that the linoelic acid disappears first and that the formation of the isooleic acid is slow at the beginning of the hydrogenation. With the oleic acid in its nascent state, the H is added preferably at the 12-13 double bond, which is the farthest away from the CO_2H group, while the isooleic acid is formed either by isomerization of oleic acid or more probably by selective fixation of of H to the 2 isomers of linoleic acid with the double bond at 12-13 or 11-12 C linkages. The selectivity does not show up in the hydrogenation at ordinary pressure, but appears when reduced pressure is used which explains the stopping of the hydrogenation at an I no. of 80, indicating that 1 isomer of the linoleic acid can be hydrogenated without touching the other one. This would support the existence of an α - and β - isomer as already indicated by Bedford (cf. Hilditch and co-workers, C.A. 33, 1528). The phys. properties such as the hardening, odor, and fluorescence and the nutritive properties of the hydrogenated products are discussed.

F. G.

REFINING RESIDUES FROM PEANUT OIL.

Seifenfabr., 34, 643; C.A. 8, 2818 (1914).

Ford, A. V. de

PEANUT-OIL PRODUCTION IN MARSEILLE.

Cotton Oil Press 4, No. 9, 54-5(1921); C.A. 15, 606(1921).

In Marseilles the best grades of peanut oil are made from nuts imported in the shell largely from West Africa. Low grade oils are used mainly for soap making, but to some extent for lubricating and lighting. For making edible peanut oil the nuts are always shelled and the red skins and germs removed by machinery before pressing. "Marseillaise" and Anglo-American hydraulic presses are both in use, but the first pressing is always made cold. The yields are 21-23% in the first pressing and 10-11% in the second. The cold-pressed oil is not refined, being merely filtered and if intended for margarine bleached.

Gallay, Wilfred

CANADIAN BENTONITES.

Can. J. Research 16, B, 6-34(1938); C.A. 32, 2647(1938).

A no. of Canadian bentonites were investigated as refining and bleaching agents for a variety of industrially important petroleum and fatty oils including the following: lubricating-oil distillates; cracked motor fuel distillates; peanut, cottonseed, coconut and palm oils; lard and beef tallow; linseed oil; pilchard oil; used crank-case oils; insulating oils and dry-cleaning solvents. The raw materials and test methods were chosen to conform to industrial practice. Canadian clays were chiefly from the 4 western provinces, and comparisons are shown with the results obtained on several imported clays now in use. Several Canadian bentonites show good results in the bleaching of fatty oils and petroleum distillates. Bentonite from the Morden, Manitoba, district possesses unusually high absorbent power, and in the activated condition its effect on all the raw materials tested is much superior, within the limits of the lab. test methods employed, to that of all other bentonites examd. Optimum methods of activation of these bentonites are discussed. Low SiO_2 to Al_2O_3 ratio and high percentage of combined H_2O are the outstanding characteristics of Morden bentonite, in comparison with adsorbent clays from other sources. Bentonites were not found suitable for use in the vaporphase percolation treatment of cracked distillates.

Gensecke, Wilhelm (to American Lurgi Corp.).

REFINING VEGETABLE AND ANIMAL OILS AND FATS.

U.S. 1, 968,252, July 31.; C.A. 28, P 6009(1934).

For removing mucins, phosphatides, etc., and fatty acids, the mucins, phosphatides, etc., are pptd with saline electrolyte solns. also contg. an acid (such as a soln. of $MgSO_4$ or of Na_2SO_4 and H_2SO_4), & fatty acids and any acid added in the treatment are neutralized with alkali before sepg. the pptd. substances and the latter are then allowed to settle and are sepd. Details are given of the treatment of soybean oil and earth-nut oil.

Glick, B. W.

VEGETABLE CARBONS IN THE OIL-REFINING INDUSTRY.

Cotton Oil Press 4, No. 10, 41-2(1921); C.A. 15, 1227(1921).

From materials, either carbonized or readily carbonizable, containing little ash, chars for decolorizing solns. have been developed equal to or better than bone charcoal. Most of these new chars are vegetable and are made by burning under conditions supposed to "activate" the carbon, then leaching out the mineral matter. In oil bleaching it is improbable that chars will entirely replace fuller's earths, but they are being used with earths to good advantage. Carbons active for gas absorption are usually poor bleaching agents. Also a char good for glycerol will often be useless for sugar solns. or oils. Most color substances are of a colloidal nature and, therefore, exhibit elec. properties. When fuller's earth is suspended in water and electrolyzed the particles move toward the anode, which indicates that it behaves like a colloid with a negative charge. Work with dyes of known electrical potential shows that fuller's earth is particularly active for

the removal of dyes with plus charges and useless with those having minus charges. Similar tests with active chars show that carbon will absorb varying amts. of both plus and minus colloidal matter. Most carbons act more strongly on colloids. With cottonseed and peanut oils a mixt. of fuller's earth and carbon is more effective than either alone, but with coconut oils the char alone is necessary.

Hapgood, C. H. and Mayno, G. F.
PURIFYING VEGETABLE OILS.
Brit. 228,889, Feb. 6, 1924; C.A. 19, P 3028(1925).

Cottonseed oil, corn oil, peanut oil, soybean oil or similar oils are purified by treatment with fuller's earth, silica gel, diatomaceous earth or similar material, followed by treatment with a NaOH soln. or other reagent for removing fatty acids. During the first step the oil is heated to a higher temp. than that for the second step. An app. is described.

Heim, F., Job, A., and Sturzwage, H.
HYDROGENATION OF PEANUT OIL.
Bull. Off. Colon. (France) 11, No. 127-8, 355-61(1918); Internatl. Inst. Agr.(Rome), Internatl. Rev. Sci. and Pract. Agr. 10, No. 1, pp. 108-9(1919); Expt. Sta. Rec. 41, 805; C.A. 14, 2096(1920).

H., J. and S. describe an app. for the hydrogenation of oils on a small scale with the use as a catalyzer of hydrated Ni formate, $(HCOO)_2Ni.\ 1.5H_2O$, and describe the hydrogenation of arachis (peanut) oil with the app. The hydrogenated oil obtained was a hard wax-like solid, m. 58°, I number 13.5, temp. of solidification 47.8°. The possibility is suggested of altering these consts. by varying the time and temp. of the reaction so as to obtain a fat of the same hardness as different animal fats.

Hill, Roger B. (to Brown Co.)
REFINING EDIBLE OILS SUCH AS PEANUT OIL.
U.S. 1,749,976, March 11; C.A. 24, P 2322(1930).

The oil is treated with 0.05-0.15% of a 30-75% H_2SO_4 soln., the H_2SO_4 and also the free fatty acid present are neutralized, sufficient bentonite is added to coagulate the neutralized impurities, and the coagulated material is sepd. from the oil.

I. G. Farbenind, A-G
DISTILLING CONSTITUENTS OF FATS, OILS, TARS, ETC.
Brit. 313,254, April 10, 1928; C.A. 24, P 9834(1930).

In effecting distn. by the introduction of liquids such as benzine or water beneath the surface of liquids from which volatile substances are to be expelled (the temps. being such that the first liquid is suddenly vaporized in the second), a special app. which is described is used for introducing the first liquid without premature volatilization. An example is given of the treatment of peanut oil contg. 5% of free fatty acid at 250° in a vacuum app. with water preheated to 175° under 8 atm. pressure.

I. G. Farbenind, A-G.
NEUTRALIZING FATS AND OILS.
Brit. 312-523, July 2, 1928; C.A. 24, P. 983(1930).

Free fatty acids in linseed, soybeans, castor or peanut oil or other oil or fat are neutralized, under heat and pressure, with an alkylene oxide such as ethylene or propylene oxide, with or without a catalyst such as metallic acetates, chlorides, phosphates or oxides. The products may be further esterified. Various details and modifications of procedure are described.

I. G. Farbenind, A-G
(Wecker, Ernest and Held, Robert, Inventors).
ESTERIFYING FATTY ACIDS.
Ger. 563,626, Dec. 28, 1930; C.A. 27, P. 1007(1933).

Satd. or unsatd. higher aliphatic acids are esterified by treatment with di - or tri-hydric acls., their semi-esters or with fatty acids or their esters contg. OH groups. App. for the process is described. Examples describe the esterification of peanut oil with glycerol, to form glycerides. Cf. C.A. 26, 5576.

Jordan, Otto and Kraemer, George
(to I. G. Farbenind, A-G)
NEUTRAL FATS AND OILS.
U.S. 1,786,248, Dec. 23; C.A. 25, P 614(1931).

Linseed, soybean, peanut or castor oil or other fats or oils contg. free acids are treated with an alkylene oxide such as ethylene oxide at 100-200° which serves to react with the free acids. Catalysts are used such as acetates, phosphates or chlorides of alkali or alk. earth metals, Al_2O_3 or TiO_2. Cf. C.A. 24, 983, 5522.

Kaufmann, H. P.
SATURATED FATTY ACIDS BY HYDROLYSIS AND HYDROGENATION OF UNSATURATED MATERIALS.
Brit. 345,626, Dec. 27, 1928; C.A. 26, P 328(1932).

Examples are given of the treatment of cottonseed oil, earthnut oil and linseed oil (water or water together with ZnO being used to effect hydrolysis, and Ni-C or Ni-kieselguhr being used as catalyst) and a combined treatment of methyl oleate to produce stearic acid also is described. Mixed products may be obtained by a limited and partial hydrogenation.

Kaufmann, H. P. and Hansen-Schmidt, E.
THEORY OF THE HARDENING OF FATS.
Ber. 60B, 50-7(1927); C.A. 21, 1556(1927).

Two of the chief questions which remain to be answered in connection with the Ni process of hardening fats are: How does the addn. of the H proceed in a mixt. of singly and multiply unsatd. glycerides, and what products condition the hardening, i.e., the raising of the m.p.? The object of the present investigation was to throw light upon the 1st question by detg. by means of the I no. and the thiocyanogenometric I no. (T-I no.) (cf. C.A. 20, 2989, and earlier papers) the amts. of singly and multiply unsatd. glycerides present at various stages of

the hardening process. Thus a peanut oil (whose only unsatd. constituents are glycerides of oleic and linolic acid) with an I no. of 85.8 and a T-I no. of 69.4 was hydrogenated with a Ni catalyst in an autoclave at about 200 degrees and samples were taken every 15 min. until the hardening was complete in 135 min. when the fat m. 30.5 degrees. The T-I no. remained const. within the limits of exptl. error throughout the process and the amt. of satd. constituents also remained practically const. but the % of glycerides of oleic acid and its isomers changed from 61.2 to 83.8 and that of the glycerides of linolic acid from 19.2 to 0. The hardening would therefore seem to result from the formation of glycerides of higher melting isomeric oleic acids; 3.2 g. of the fatty acids obtained by the usual sapon. method from the final product and sepd. by the Twitchell Pb salt-alc. method yielded 1.55 g. solid and 1.6 liquid acids with I nos. of 59.3 and 89.7, resp., showing that the hardened oil contained 51% glycerides of oleic acid (about 10% less than the original oil), 32.8% glycerides of solid isomers of oleic acid and 16.5% glycerides of satd. acids and unsaponifiable matter. Again, in a sunflower oil with I no. 117.0 and T-I no. 72.5 hydrogenated 285 min. (when it m. 480) the T-I no. remained const. at first while the I no. fell; then, before the 2 values reached equality the T-I no. fell a few units but at the end of 195 min. both nos. were the same (62-3). At this point the % of satd. glycerides had increased about 16% at the expense of the linolic acid glycerides, the greater part of which has been reduced to glycerides of oleic acid; these together with those originally present, amounted to about 70%. On further hydrogenation a new discrepancy between the T-I and I nos. (8 units at the max.) appeared. The fats obtained from a sample hydrogenated 210 min. (when the T-I and I nos. were equal) yielded a liquid acid consisting solely of oleic acid and almost equal in amount (about 33%) to the oleic acid present in the original oil, and solid acids with an I no. of 49.6, contg. 28% satd. acids and 34% isoleic acids produced, together with 15% satd. acids, from the linolic acid in the original oil.

Lederer, E. L.

THE PHYSICAL CHEMISTRY OF THE FATTY ACIDS.

Z. angew Chem. 42, 1033-5(1929); C.A. 24, 3388(1930); cf. C.A. 24, 741, 2625.

Cu and Al were exposed to the conditions of a hydrolytic autoclave, operating at a pressure of 12 atm., for 1024 hrs. The measured corrosion of Cu by technical peanut oil at 188° was 0.009 g./sq. m./hr., of Al, 0.042 g./sq.m./hr. Stearic acid corroded Ni to the extent of 0.62 gr./sq.m./hr. at 190°. The discoloration of technical fatty acids is not due to the influence of light. Conds. of various fatty acids at temps. ranging from 100° to 190° were nearly the same. Up to 140° the specific cond. is a linear function of the temp., above which the curve becomes concave to the temp. axis.

Lynch, D. F. J.

THE PEANUT INDUSTRY. IV. PEANUT OIL.

J. Chem. Education 7, 1617-31(1930); C.A. 24, 3916(1930).

Nord, F. F.

CATALYTIC REDUCTION OF FATS WITH PALLADIUM.

Z. angw. Chem. 32, I, 305-9(1919); C.A. 14, 853(1920).

The use of Pd as a catalyzer has the advantages of rapidity of action and low temp. requirements, but in order to be practicable it is necessary that complete recovery of the spent catalyzer be obtained. Expts. made by N. were carried out in a steel autoclave, provided with a stirrer, and conical at both ends. The inside was lined with glass and heat was provided by winding the shell with nickel wire similar to an electric oven. Rape oil, 50 g. with I no. of 101, and 200 cc. alc., 30 cc. H_2O, 12 cc. concd. HCl, and 10 cc. of 1% $PdCl_2$ were heated to 90° and H was introduced at a pressure of 10 atm. for 9 hrs. when the I no. was reduced to 15.6. In case of soybean oil, I no. 123, 50 g. were mixed with 10 cc. $PdCl_2$ soln., 10 cc. of a 1% gum arabic soln. and 10 cc. concd. HCl and heated to 70° for 10 hrs. while H was introduced at a pressure of 8 atm. The I no. was reduced to 6.5. Castor oil under the same conditions has the I no. from 84 to 27.2 in 14 hrs. Cottonseed oil had a reduction in I no. from 110 to 26 in 7 hrs. and the Halphen reaction had nearly disappeared. In the case of peanut oil the I no. was reduced from 98 to 0 in 7 hrs. Japanese fish oil having an I no. of 188 showed a reduction for 4 tests varying from 30 down to 22.8. A further expt. was made with cottonseed oil using 100 g. oil and 5 cc. of a 1% $PdCl_2$ soln. Without any protecting colloid for the Pd and in 10 hrs. an I no. of 30.5 was obtained.

Normann, W.

OIL HARDENING AT LOW TEMPERATURES.

Chem. Umschau Fette, Oele, Wachse Harze 38, 289-90(1931); C.A. 26, 612(1932).

Samples of peanut and linseed oil in ether soln. were shaken at room temp. with 1.2-4.0% Ni (on kieselguhr) at 145-400 atm. pressure for 24-48 hrs. In all cases hardening occurred, varying from soft tallow consistency to brittle fat. The increased pressure effects only a shortening of the time required for hardening, while the low temp. effects a selective satn. of the double bonds. This selectivity has heretofore been obtained in the factory at high temp. (180°) by means of a partial killing of the catalyst sufficiently to sat. easily the 9,10 double bond of linolic acid, without satg. the other, thereby forming isooleic acid.

Pick, H. and Kraus, R.

ADSORPTION BLEACHING OF VEGETABLE FATS AND OILS

Kolloid-Beihefte 35, 211-64(1932); C.A. 26, 4192(1932).

The bleaching of palm oil, coconut oil and peanut oil with the adsorbent charcoals Carboraffin and Tonsil AC was extensively studied to determine optimum conditions. The field of bleaching of vegetable oils is reviewed. The bleaching effect of an adsorbent is sp. for one oil, and the effect of mixed adsorbents cannot be predicted. Addn. of a small amt. of C. to fuller's earth increases the bleaching efficiency.

Pick, Lev.

THE BEHAVIOR OF BLEACHING POWDERS IN ACID OILS AND ATTEMPTS AT REMOVING FREE ACID BY DISTILLATION.

Allgem. Ol-Fettztg. 27, 291-4(1930); C.A. 25, 2316(1931).

Bleaching earths and carbons, when mixed at 105° with peanut oil or coconut oil, contg. free fatty acids, were found partially to remove the free acidity. This was found to be true for acid earths, as well as for neutral earths, when amts. of 10-50% were used. This removal of free acid is thought to be due to the adsorption of the free carboxyl groups to the surfaces of the bleaching powder. This interferes with the adsorption of pigments, and thus accounts for the lower bleaching power of earths and C on acid oils. Attempts to remove the free acidity from peanut oil by steam distn. at atm. pressure were only partially successful. The best results were obtained at 287°, the free acidity being reduced from 3.5 to 2.0%. During the distn. 2.7% of fatty acids was distd. off, showing that hydrolysis had taken place. When this procedure was used on coconut oil, the free acidity was reduced from 2.2 to 0.2%. The distn. temp. was 305°. When 3% of coconut oil was added to peanut oil (free acid 4.5%) and subjected to the above process, at 300°, the free acid was reduced to 0.4%. This difference in behavior of the 2 oils is said to be that, at temps. of 280° to 300°, the higher free acids replace the lower acids of coconut oil, which at this temp. are readily distd. leaving a practically neutral oil. Attempts were also made to remove the free acid by distn. with a volatile solvent. An app. is described in which the oil dissolved in benzene (2:1) is subjected to a continuous distn. under a reduced pressure of about 100 mm. Hg. The benzene soln. is drawn through a long Al tube submerged in an oil bath at 300°, and thence into a flask submerged in an oil bath at 250°. The neutral oil collects in this flask, while the fatty acid and benzene vapors are carried through a condenser into a receiver. This procedure reduced the free acid of peanut oil from 4.0 to 0.4%, and that of coconut oil from 1.4 to 0.1%. In another sample of coconut oil the free acid was reduced from 13.6 to 0.7%.

Raghavachari, K.

PRODUCTION AND MARKETING OF GROUNDNUT IN THE MADRAS PRESIDENCY.

Madras Agr. J. 23, 356-62(1935); C.A. 30, 182(1936).

When they were stored in dans for 6 weeks, undried groundnut kernels became highly rancid (acid value 101-175) and were subject to attack by fungi and insects. Deterioration in storage was entirely prevented by drying the kernels at steam-oven temps.

Rallis, Jean

THE ACIDIFICATION OF STORED PRESS CAKES.

Bull. mat. grasses inst. colonial Marseille 20, 43-7(1936); C.A. 30, 4028(1936).

Data are presented (both tabulated and plotted) on the variation with time of storage of the acidity of the oil extd. with CS_2 from: (1) hot pulp, (2) press cake as removed from the bags coming out of the press, (3) trimmings from the press cakes. All samples were taken in the course of regular com. operation as currently carried out at Marseilles in the production of peanut and castor oils under a pressure

of 200 kg. per sq. cm. Owing to variations in conditions (atm. temp. and humidity, conditions of storage, etc.) the results are not of abs. value, but are strictly comparable. In the course of 2 months (a storage period which is frequently reached in com. practice) the acidity can increase from 5- to 10-fold. When the quality (practically, the acidity) of the raw material is known, the age of the press cake can be estd. to within 20%. The oil removed by the press always has a lower acidity than that remaining in the press cake.

Schmidt, Erich, Hahn, Walter, Duttenhöfer, Herta and Maerkl, Josef.
THE DEACIDIFICATION OF ANIMAL AND VEGETABLE OILS OR FATS BY MEANS OF CARBODIIMIDES.
Ber. 72B, 945-8(1939); C.A. 33, 6075(1939); cf. C.A. 32, 9057.

There is a voluminous literature on attempts to overcome the various difficulties and disadvantages of the different methods generally employed to free crude animal and vegetable oils and fats from acids. From the results recorded in this paper, the use for this purpose of carbodiimides, RN:C:NR (I), affords a simple method which seems not less worthy of attention than those which have previously been described. Herring, pilchard, sardine, whale, cottonseed, coconut, peanut, linseed, poppyseed, palm-nut, castor, rape and soybean oils, turpentine, ox tallow, animal body fat, hardened sardine and whale oils have been completely deacidified by treatment with one of the following I (cf. C.A. 32, 9057): di-Pr, di-Bu, diiso-Bu dicyclohexyl, cyclohexylpropyl, cyclohexyl (methoxymethyl), cyclohexyl (β bromoallyl). The velocity of the deacidification depends on the temp. at which the I acts on the free acids and especially on the nature of the fat or oil. The ureides of the free acids frequently crystallize out but often they are so sol. in the oil or fat that they do not sep. The dicyclohexylacylureas, especially, are difficulty sol. in almost all oils and fats, even on heating, and can readily be sepd. from the neutral oils or fats. The amt. of I required for complete deacidification can be calcd. from the amt. of alkali required to neutralize the oil or fat; this is detd. by making a mixt. of 25 cc. alc., 25 cc. ether and 6 drops phenolphthalein in a pressure flask faintly red with 0.1 N NaOH, adding about 1 g. of the oil or fat and titrating with 0.1 N aq. NaOH from a microburet until the soln. shows for several sec. the same color as before the addn. of the oil. An equimol. amt. of I is insufficient for complete deacidification of herring, pilchard and sardine oils, beef tallow, animal body fat, poppyseed and rapeseed oils; a 10-100% excess is required. Generally 10-20 g. oil was deacidified by heating at 70-80°, but equally good results were obtained with larger amts. Deacidification is complete in 1-30 hrs. and the products which sep. can be removed by centrifuging the oil or molten fat. Completion of the reaction is detd. by adding 1 g. of the treated oil to the reddened mixt. of alc. and ether prepd. as described above; when the color does not disappear for several sec. or requires only 1-2 drops of 0.1 N NaOH for its restoration the oil may be considered as being completely deacidified. The results obtained with the different oils (amt. of 0.1 N NaOH required for neutralization, name and amt. of I used, and length of time required for deacidification) are given in a table.

"SCIENTIFIC CENTRAL STATION FOR OIL AND FAT RESEARCH." REPORT OF WORK DONE Chem. Umschau 30, 198-202(1923); C.A. 17, 3615(1923).

High molecular fatty acids, fatty anhydrides, iodine number determinations and oil refining. D. Holde. A brief summary is given of the prepn. of the anhydrides of erucic, brassidic, fish oil, naphthenic, palmitic and stearic acids, using the Hanus method for the detn. of their I nos. as criterion for the purity of the acids and their anhydrides. The refining loss in a peanut oil with 8.3% free fatty acids was reduced to 3.3% by slowly adding enough 20% caustic at 60 to 70° to neutralize only 95% of the free acids; the soap, on rising to the top, formed a firm cake on standing overnight at 10-5°. The cake was melted and filtered at 80° and the filtrate, which contained some dissolved soap, was cooled to 30° at which temp. the soap sepd. out. The final soapstock contained 25-30% oil, representing a total loss of 3.3% on the basis of the original oil. The refined oil still contained 0.8% free acids, but was fit for edible use.

Rapid removal of emulsions in refining fats. H. Bechhold.--Emulsions were prevented by adding NaCl during refining, thereby producing a granular soapstock which could be easily handled. Also by addn. of "absorption-powders" which reduced the free fatty acids from 0.9% to 0.1%. Soft soapstock could be readily extd. by means of benzene after NaCl had been added to the stock.

Content of oil in oil seeds. Kleberger.--Several thousand samples of poppy and mustard seed were examnd. for H_2O, dirt, hulls, oil and protein. The results demonstrated the utter want of harmony between market price and actual value of the seed.

Glycerides of fats and oil. A. Bomer.--The following glycerides were isolated from palm-kernel oil and their m. ps. detd.: (1) caprylomyristoolein, 14°; (2) dilauromyristin, 33°; (3) laurodimyristin, 40°; (4) dimyristopalmitin, 45°; (5) myristodipalmitin, 51°. Palm-kernel oil contains over 50% of No. (1) glyceride. The following glycerides were isolated from hardened castor oil: (1) trihydroxystearin, m. 89.4°; (2) stearodihydroxystearin, m. 75.0°; (3) distearohydroxystearin, m. 69.5°.

Speers, P. C., Yajnik, N. A., Goyle, D. N., and Shafi, Mohd.
THE SAPONIFICATION OF EMULSIFIED OILS.
J. chim. phys. 30, 414-19(1933); C.A. 27, 5563(1933).

Peanut oil was emulsified with redistd. water either by mech. agitation alone or with a specially prepd. neutral peanut-oil soap as emulsifier. The rate of sapon. was increased by (a) increase in degree of dispersion of the oil (time of agitation prior to addn. of alkali), (b) increase of vol. of the oil phase and (c) increase in quantity of emulsifier. Increase in alkali concn. beyond the quantity equiv. to the oil is without effect. A large excess of alkali or the addn. of NaCl decreases the sapon. rate on account of demulsification. Diln. with water decreases the rate and addn. of EtOH increases the rate markedly.

Turner, F. M.
PURIFYING VEGETABLE OILS.
U.S. 1,448,581, Mar. 13.; C.A. 17, P 1900(1923).
Cottonseed oil, coconut oil, peanut oil, etc., is sepd. from particles of meal, mixed with H_2O; treated with steam under pressure and the H_2O is then sepd. from the oil, to effect purification.

Viollier, R. and Iselin, E.
HYDROGENATED PEANUT OIL.
Mitt. Lebensm. Hyg. 29, 1-10(1938); C.A. 32, 5239(1938).
The mechanism of the hydrogenation was followed by the iodine and thiocyanate nos.

Waterman, H. I., VanDijk, J. A. and Van Vlodrop, C.
EFFECT OF VARYING CONDITIONS IN THE CATALYTIC HYDROGENATION OF FATTY OILS ON THE NATURE OF THE REACTION PRODUCT. I.
Rec. trav. chim. 51, 653-66(1932) (in English); C.A. 26, 5441(1932).
Expts. in the hardening of oils, which have indicated the formation of larger quantities of satd. fatty acids at low temp. than at high temps. (C.A. 25, 5051), have been extended to include peanut oil, oleic acid, Et oleate and Et linoleate. The I no.-satd. fatty acid diagrams (cf. Williams, C.A. 22, 693) of these and previously reported hydrogenations indicate clearly the difference between Norman's method and hydrogenation at low temp. with high or low H_2 pressure. Ni on kieselguhr and Pt on active C were used as catalysts.

Waterman, H. I. and Zaayer, M.
HYDROGENATION OF PEANUT OIL.
Rec. trav. chim. 51, 401-6(1932); C.A. 26, 3688(1932).
A peanut oil was hardened at 180° with 3% catalyst contg. 17.1% Ni in Normann beakers at atm. pressure; a 2nd sample of the same oil was hardened at 140-180° with 3% catalyst contg. 15.4% Ni, at 5-1.2 kg. pressure per sq. cm. (Wilbuschewitz conditions). Samples were taken at intervals and analyzed. In the Normann run the I no. dropped from 88.6 to 71.8, the thiocyanate no. from 71.2 to 70.1. In the Wilbuschewitz run these values were 88.6 to 55.6 and 71.2 to 54.2, a drop in both of these values, also a slight increase in satd. acids. The conclusion is drawn that Normann's conditions of hardening permit a selective satn. of the unsatd. acids while W.'s conditions do not favor selectivity.

Webster, P. T.
BASKERVILLE METHOD OF REFINING VEGETABLE OILS.
Cotton Oil Press 5, No. 5, 36-8; C.A. 16, 2421(1922).
The Baskerville process for refining vegetable oils (C.A. 15, 320, 606) under factory conditions gives a better break and more easily filtered foots than are obtained by the best preliminary test with 500-cc. samples in the lab. Data from lab. refinings of 38 samples of soybean, peanut, cottonseed and coconut oils show in all cases the best refining by the Baskerville process gives a lower loss than by the old method. Because a soap stock which is firm and porous rather than coherent is desired it is best to work with strong NaOH solns. 25° Bé. usually gives satisfactory results.

Wecker, E.

REFINING OILS CONTAINING FATTY ACIDS.

U.S. 1,622,120, March 22.; C.A. 21 P 1557;(1927).

After heating peanut oil or other oil, a liquid such as H_2O which is highly volatile at the temp. to which the oil has been heated, is injected into the oil in finely divided form, to distil off fatty acids.

Wittka, F.

PRACTICAL TESTS ON PARTIAL HARDENING OF STRONGLY UNSATURATED OILS. I. LINSEED OIL.

Allgem. Oel- u. Fett-Ztg. 33, 305-9(1936); C.A. 30, 7369(1936).

The aim of the investigation was to produce a nondrying oil of low I no. from a highly unsatd. drying oil. Drying oils when hardened to an I no. of 90 have yielded only soft fats instead of a liquid product, owing either to formation of isooleic acid or to hydrogenation of part of the oil fat acids past the oleic acid stage. A highly active Ni-kieselguhr catalyst was prepd. Several hydrogenation tests on peanut oil made at temps. of 40-100° (10° intervals) indicated that the activity of the catalyst increases considerably between hydrogenation temps. 70° and 80° when judged from the standpoint of solidification temps. of products. Linseed oil was hydrogenated at 50°, 60°, 70°, 90° and 100°, resp., with 1% catalyst which contained 30% Ni. The usual increase in solidification point and decrease in I no. occurred with increase in hydrogenating temp. Hydrogenation at 70° for 60 min. gave a product liquid at 0° with an I no. of 97.8, while the product of hydrogenation for 50 min. at 90° solidified, at 30° and had an I no. of 98.1. W. concluded that this sharp increase in solidification point above 70° is due to formation of isooleic acid. The hydrogenation at 70° was repeated to obtain sufficient oil for further tests. A 48-hr. test with the oil contg. 2% siccative proved that the oil was nondrying. Analysis of the oil gave: I no. 97, SCN no. 74.2 and hexabromide no. 0. Fat acid compn.: satd. solid acids about 16, unsatd. solid acids 12, oleic acid 42 and linoleic acid 30%.

Wolff, G.

CHANGES IN COMPOSITION RESULTING FROM COMMERCIAL TREATMENTS, MORE PARTICULARLY AS REGARDS THE INFLUENCE OF REFINING ON LIPOID CONTENT.

Ann. fals. 29, 537-8(1936); C.A. 31, 2844(1937).

Attention is drawn to Marcelet's work (preceding abstr.) showing loss of phytosterol and hydrocarbons on filtration and neutralization of soybean oil, linseed oil, corn oil, peanut oil and pork fat; and it is suggested that means of reincorporating the requisite amt. of lecithin be studied.

Wörner, Emil

PROCESS OF PREPARING AN EASILY EMULSIFIABLE FAT.

German Patent 175,381, Sept. 14, 1904, Berlin; C.A. 1, P1199(1907).

Process of preparing an easily emulsifiable fat, in water, consisting in mixing with the fat or fatty oil, and bromine or iodine or mixtures of the halogens, substances of the vegetable or animal kingdom such as extracts of egg yolk, brain, nerve substance, liver, milt, malt, sprouts, in alcohol, ether, chloroform, petroleum ether, and

which contain phosphorus in organic combination, then in heating the whole until all the solvent is driven off. The residuary oil, for example, peanut-oil, consists as a mixture with water of a stable creamu character, capable of resorbing fat, also medicines incorporated therewith. The product may serve as a substitute for cod liver oil, and is applicable as a lubricating or drilling oil.

Baughman, W. F. and Jamieson, G. S.
THE KEEPING QUALITY OF CRUDE PEANUT OIL.
J. Oil & Fat Ind. 3, 431, 449(1926); C. A. 21, 1195(1927)
If all of the foots are removed from crude peanut oil, the keeping quality is very good but oil in contact with foots deteriorates.

Grettie, Donald P. and Newton, Roy C.
(to Swift and Co.)
STABILIZING OILS AND FATS.
Brit. 415,205, Aug. 23,1934; C.A. 29, P 950(1935).
Rancidity of oils and fats, e.g., cottonseed oil and lard, and cloudiness or seeding-out of salad oils, e.g., olive and peanut, are inhibited by adding a small percentage of crude cottonseed oil, which may first be deodorized, e.g., by blowing with steam, without impairment of its anti-oxidizing power. Cf. C.A. 28, 668.

Musher, Sidney (to Musher Foundation, Inc.)
STABILIZING OILS AND FATS.
U. S. 2,069,265, Feb. 2.; C.A. 31, P 2037(1937).
Rancidity of peanut oil, butter, lard or other glyceride oils or fats is inhibited by the addn. of a small proportion (suitably about 5%) of a direct infusion of an oil-contg. seed material such as ground peanuts contg. antirancidity constituents, the material under treatment being then substantially freed from seed fibers, as by filtration. Cf. C.A. 30, 6592.

Sabalitschka, Theodor, and Böhm, Erich
ANTIOXIDANTS FOR OILS.
Brit. 498,110, Jan. 3, 1939. : C.A. 33, P 4450(1939).
The oxidation of org. substances readily liable to atm. oxidation is prevented by incorporation of substances of formula RCOOR'N-(R")R"', where R is H, alkyl, alkylene or aryl, which may be substituted by OH, hydroxyalkyl, alkyl or NH_2, R' is alkylene with not more than 4 C atoms, R" is alkyl with not more than 3 C atoms and R"' is H or alkyl with not more than 3 C atoms. Examples mention $C_2H_5COO-(CH_2)_3NEt_2$ as an anitoxidant for peanut and linseed oil and $C_3H_7COO(CH_2)_2NMe_2$ for linseed oil.

Tschirch, A. and Barben, A.
RANCIDITY OF FATS.
Schweiz. Apoth. Ztg. 62, 281-5, 293-5(1924); C.A. 18, 2970(1924).
The conditions for fats turning rancid are presence of air and light (Ritsert, 1890), H_2O and unsatd. fatty acids. The fats examd. were hog lard (Pharm. Helv. IV, I no. 60), and hydrogenated arachis fat (A); "astra fat" (I nos. from 81 to 1). Ointments contg. KI were made from each, and the progress of rancidity was seen by the yellow color caused by the parallel liberation of I. Lard proved more liable to turn rancid than A of the same I no.; and A became permanent

with low I no. Rancid fats showed H_2O present, and gave the Kreis test for deterioration (Swiss Food Code). The steps in the development of rancidity are summarized: Exposed to air and light, the mol. of unsatd. acids adds O_2 at each double bond, forming a peroxide (Wegner, Hazura). slowly removes O, forming an oxide, also H_2O_2 and O_3 (Houzeau). O_3 at once adds O_2 forming the unstable ozonide, which H_2O breaks up (Harries) into simpler mols. of odorous aldehydes and ketones, and acids, some of higher m.p. This, together with bleaching by H_2O_2, explains all phenomena of rancidity. Imitating these conditions, A of I no. 65 was mixed with PbO_2 and H_2SO_4; rancidity developed within 2 hrs. Again, a KI ointment made with a mixt. of A(I no. 1) and vaseline oil (3:7) remained white after 60 days.

Werner, H., Schmalfuss, H. and Gehrke, A.

THE GREATER TENDENCY OF SATURATED FATS TO UNDERGO CHANGE THAN UNSATURATED FATS. ALDEHYDE FORMATION IN PURIFIED FATS. III. HEAT AND ALDEHYDE FORMATION.

Margarine-Ind. 29, 4-8(1936); Chem. Zentr. 1936, I, 2647-8; C.A. 31, 6040(1937); cf. C.A. 30, 6223.

The observation that lauric acid is apparently more easily partially oxidized to aldehyde under the influence of heat than the unsatd. soybean oil, while the reverse would be expected, prompted investigations to det. whether some of the aldehyde formed was not destroyed again by the heat. This series of expts. was therefore extended, the samples being kept during the intermediate time interval not only at 150° but also at 180° and 120°. The amts. of aldehydes and of epihydrinaldehyde formed were measured. The method of measuring aldehyde formation is based on that of Fellenberg. The color depth was compared with that of a series of standard crystal violet solns. Mixts. of pure fats with aldehydes were not suitable for standards, because the depth of color obtained with fuchsin-sulfurous acid increases after a long time and the color at first becomes deeper the longer the mixts. are shaken. Therefore, standards were made up by proper diln. of a stock soln of crystal violet contg. 0.01 g. in 100 cc. of water. To 2 cc. of the various dilns. in test tubes 2 cc. of a mixt. of equal parts of peanut or soybean oil and $CHCl_3$ or CCl_4 was added and the standards so prepd. were kept in the dark. To calibrate these standards a series of dilns. of heptylaldehyde in petroleum ether were prepd. (starting with 0.100 g. in 4 cc.) and to 1 cc. of each diln. 1 cc. of aldehyde-free oil (as pure soybean oil) was added. Then to each tube 1 cc. of fuchsin-sulfurous acid, prepd. according to Fritzker and Jungkunz (C.A. 21, 506), was added and the mixt. shaken 2 min. During the next min. the tube was compared with the series of crystal violet solns. and the latter calibrated in this manner. 0.0012% heptylaldehyde in oil corresponds to 0.00016% crystal violet in water (the limiting value). The actual aldehyde detns. were then carried out by shaking for exactly 2 min. 1 cc. of the oil under examn. in 1 cc. petroleum ether with 2 cc. fuchsin-sulfurous acid and comparing with the standards during the next min. Solid fats (1 cc.) were dissolved in CCl_4 (1 cc.), the solns. cooled to 20° and tested as above. The method for detg. epihydrinaldehyde formation is based upon that of Kreis and depends upon comparison

with methyl red standards. The stock soln. (0.01 g. methyl red in 100 cc. alc.) was dild. with an equal vol. of HCl (sp. gr. 1.19) and subsequent dilns. were made with the HCl. Then to 1 cc. of each diln. there was added 2 cc. of a mixt. of equal parts peanut or soybean oil and ether. These standards were stored in the dark and calibrated as follows: A soln. of epihydrin in oil (peanut or other oil) was dild. with paraffin oil to give a series of dilns. To 1 cc. of each diln. was added 1 cc. HCl (sp. gr. 1.19), the mixt. shaken 1 min., then 1 cc. of a soln. of 0.1 g. phloroglucinol in 100 cc. ether was added, and the mixt. shaken 20 sec. At the end of 2.5 min. more the solns. were compared with the methyl red solns. and the latter calibrated within 4 min. 0.001% epihydrinaldehyde in oil corresponds to 0.00002% methyl red in HCl (the limiting diln. for recognition of the red tint). Detns. were made on the oils under examn. by adding 1 cc. HCl to the oil (1 cc.) shaking 1 min. and completing the detn. as in the calibration. The effect of heat upon aldehyde formation was tested with a no. of substances. Two cc. of the oil was heated in a sealed tube for from 5 min. to 96 hrs. at 120°, 150° and 180° and the aldehyde and epihydrinaldehyde contents were detd. All the materials tested showed aldehyde formation at all 3 temps. Coconut oil, palm-kernel oil, glycerol and paraffin oil showed a definite rise in aldehyde content, a peak and then a decline. These phenomena were less marked in the case of soybean and peanut oils; the decline was still less marked in the case of lauric acid, its Me ester, and the Me ester of caprylic acid. Coconut and palm-kernel oils showed greater aldehyde formation than glycerol and lauric acid. Epihydrinaldehyde formation occurred between 120° and 180° only in coconut, palm-kernel, soybean and peanut oils. Its formation also showed an increase, a peak and decline. Formation of aldehyde and epihydrinaldehyde was the more rapid the higher the temp. Coconut and palm-kernel fats tended most strongly to aldehyde formation. Aldehyde formation was several hundred times greater in the case of satd. fats than in that of unsatd. The 4 fats showed about equally marked epihydrinaldehyde formation. Aldehyde and epihydrinaldehyde formation increased and decreased simultaneously and in the same manner (cf. Taufel and Muller, C.A. 25, 3857). The decrease took place several hundred times more slowly than the increase; therefore long after destruction of the compds. began they could still be detected.

Angoulvant.
USE OF PEANUT OIL IN DIESEL MOTORS AND UNDER STEAM BOILERS.
Bull. matieres grasses 1919, 59-62; C.A. 13, 2992(1919).

The use of peanut oil in Diesel motors does not present any difficulties. The consumption per horse power hour for an oil having a calorific value of 8600 cals. and contg. 11.8% of H is about 240 g. In tropical countries where this oil is abundant the Diesel motor is preferable. A. believes that peanut oil can be utilized under steam boilers and is conducting tests.

Balachowsky, A.
INSECTICIDE VALUE OF EMULSIONS OF VEGETABLE OILS TO COMBAT APHIDS HARMFUL TO CROPS.
Compt. rend. acad. agr. France 17, 676-82(1931); C.A. 25, 5239(1931).

The use of peanut or second- or third-grade olive oil is recommended for insecticides. An emulsion is made by dissolving 1.5 kg. of white soap in 7 l. of H_2O, adding 0.5-1.l. of vegetable oil and stirring until a creamy consistency is obtained. This mixt. is then diluted to 100 l. with H_2O low in $CaCO_3$. At concns. of 0.5% and in rare cases 1% the mortality to injurious insects is generally 100%. At higher concns. these oil emulsions have a harmful effect on the plants. Care must be taken in using this spray on potted plants or in greenhouses as the drippings from the foliage penetrate the soil and injure the roots.

Bouchard, G.
RESIDUES FROM PURIFICATION OF ARACHIS OIL.
Mat. grasses, 7, 4027-8; C.A. 8, 2272(1914).

In refining, free acids are removed from the oil by NaOH or NH_4OH. The product of NaOH treatment, known as "arachis paste," can be used direct for soap making; its value is detd. by estg. fat content by the cake method. Total fat is 65-75%, free acids 51-76%. The NH_4OH soaps decomposed by HCl or H_2SO_4 yield "arachis oil no. 2," a mixt. of fatty acids with the neutral oil, contg. 55-70% free acid, I no. 83-93.

Cheftel, H. and Mocquard, J.
THE FRYING OF SARDINES FOR CANNING. APPLICATION OF EMULSIVE PROPERTIES TO THE EVALUATION OF THE DEGREE OF CONTAMINATION AND THE PURIFICATION OF OILS.
Ann. falsi. 32, 25-36(1939); C.A. 33, 7913(1939).

Dubrisay's (Congr. Soc. Savantes, Paris 1926, 152-69) surface-tension method, or more exactly "emulsive value," was applied to the study of variation in the compn. of oil (arachis) used for cooking sardines prior to canning. The method consists in dissolving a given wt. (10 g.) of the oil in CCl_4, making to definite vol. (100 cc.), delivering from a microburet having the tip submerged in distd. water, and measuring the vol. of a definite no. of drops (40). Detns. were made on pure arachis oil, on oil extd. with C_6H_6 from cleaned, dried

and powd. sardines, and on cooking oil at various stages during com. operations. The test clearly differentiates between pure arachis oil and oil contg. a few % of sardine oil, and gives some idea of the proportion of the latter; from an approx. quant. standpoint, the method is accurate to about ± 10% for 0.5% sardine oil, but with larger contents the accuracy decreases. With due allowance for differences in exptl. conditions, the results corroborate the findings of Beard (U. S. Bur. Fisheries Document No. 1020, 161-70(1927)). Arachis oil forms with water emulsions that are easily broken down by centrifuging, while sardine oil forms emulsions that are not broken down by centrifuging. An app. has been devised, based on this principle, for the continuous purification of the boiling oil. It consists of a cylinder closed at both ends, at one end of which is a steam injector in the axis of the cylinder with water and oil inlets; the cylinder is provided with a no. of transverse perforated plates acting as baffles. The emulsified mixt. is put through a centrifuge which seps. it into sardine oil emulsion and water on the one hand and arachis oil on the other. This treatment permits of approx. trebling the life of the cooking oil. These findings and conclusions would require to be confirmed by application to industrial operations.

Chemische Fabrik Stockhausen Et Cie.
EMULSIONS SUITABLE FOR USE AS "BORING OILS," ETC.
Brit. 312,799, May 24, 1928; C.A. 24, P 984(1930).

In emulsifying olive oil, peanut oil or other materials, there are used as emulsifying agents the sulfonated oils, fats, fatty acids, etc., such as are produced as described in Brit. 293,480 and Brit. 293, 717(C.A. 23, 1766). Products are obtained suitable for use as boring oils or in the textile and leather industries.

Chen, SSu-Yi and Yu, Wen-Hui.
PEANUT OIL AS A SUBSTITUTE FOR OLIVE OIL IN CHINESE PHARMACOPEIAL PREPARATIONS.
J. Chinese Pharm. Assoc., 1, No. 1, 24-9(in English 26-9)(1936); C. A. 30, 7783(1936).

Peanut oil, purified by washing first with 1% NaOH and then with distd. H_2O, is satisfactory as a substitute for olive oil in the prepn. of liniment of camphor, cantharides plasters and compd. ointment of Hg, but it is not satisfactory for making an ointment of $Hg(NO_3)_2$.

Delahousse, P.
TESTS WITH VEGETABLE OILS IN DIESEL AND SEMI-DIESEL ENGINES.
Chimie et industrie Special No., 764-6(May, 1923); C. A. 17, 3243(1923).

Brief outline of results obtained by various French engine constructing firms in successful tests with palm, peanut, and cottonseed oil and Karite butter.

Deutsche Hydrierwerke A.-G.(Richard Hueter, inventor).
EMULSIONS
Ger. 512, 979, June 29, 1928; C.A.25, P 1303(1931).

Substances insol. or only partly sol. in water are emulsified by the agency of acid esters of polybasic org. acids and high mol. alcs.,

or their salts. Other agents may be mixed with the esters. The examples describe the emulsification of peanut oil, etc., by esters of adipic acid and oleic or sperm oil alcs.

Deutsche Hydrierwerke A.-G.
EMULSIONS
Ger. 513,813, Jan. 17, 1929. Addn. to 512,979(C.A. 25, 1303); C.A. 25, P 1925(1931).

In emulsifying substances insol. or only slightly sol. in water, the emulsifying agent of 512,979 is replaced by the reaction products of the esters of monobasic org. acids and alcs. of high mol. wt., with polybasic org. acids. Thus, olein alc. is esterified with AcOH in the presence of H_3BO_3 and the product treated with adipic acid. The product is used to emulsify peanut oil or other neutral oils in the presence of a small quantity of NaOH. Another example is given.

Fierens, B. and DeNayer, P. P.
INHIBITING ACTION OF FATS ON GASTRIC SECRETION PROVOKED BY HISTAMINE.
Compt. rend. soc. biol. 122, 805-7(1936); C.A. 30, 7215(1936).

Dogs with gastric fistulas were used. When 50-100 cc. of peanut oil was placed in the stomach 5-30 min. before the histamine was injected the amt. of gastric juice secreted was about half the vol. secreted when the stomach was empty, and the acidity was lower than usual.

Fiero, George W.
PREVENTION OF THE DISCOLORATION OF OINTMENT OF POTASSIUM IODIDE.
Bull. Natl. Formulary Comm. 7, 313-19(1939); C.A. 33, 7041(1939).

This ointment was prepd. using 6 partially hydrogenated oils as the ointment base, and none deteriorated as rapidly as lard although the iodine value of lard (54.2) was lower than that of any of the oils except hydrogenated coconut oil (5.1) and hydrogenated lard (51.0). The hydrogenated oils are listed according to their tendency to deteriorate: cottonseed oil (iodine value 66.7), peanut (73.3), soybean (70.3), lard (51.0), coconut (5.1) and sesame (57.7). An emulsified ointment of KI using triethanolamine-stearic acid emulsifier was more stable than mixts. using the same ointment base, and these are listed according to their tendency to deterioration with lard (iodine value 54.2) and hydrogenated cottonseed oil (66.7) as ointment bases: mixed isopropanolamines-stearic acid, triisopropanolamine-stearic acid, soft soap, hard soap and borax. With hydrogenated cottonseed oils from various manufacturers there seems to be no distinct relationship between the iodine value and m.p. and their tendency to deteriorate.

Fulton, Robert A. and Howard, Neale F.
EFFECT OF ADDITION OF OIL ON THE TOXICITY TO PLANT BUGS OF DERRIS AND OTHER INSECTICIDES.
J. Econ. Entomol. 31, 405-10(1938); C.A. 32, 7647(1938).

The toxicity to the squash bug (Anasa tristis) of derris nicotine, nicotine sulfate and anabasine sulfate was markedly increased by the use of oil, especially peanut oil; the toxicity of derris was greatly increased when acetone was added 24 hrs. before use, and still

further increased by addn. of peanut oil. Freshly prepd. derris ext. was highly toxic. The vegetable oils tested (tung, teaseed, corn, peanut, olive, soybean) were more effective than heavy petrolatum oil. The milkweed bug (oncopeltus fasciatus) was less resistant to the insecticides used than the squash bug, and was relatively more susceptible at the higher humidity. Petrolatum oil was about as effective as peanut oil for this species. All of the oils increased the toxicity of derris. Sprays contg. derris (0.015% rotenone) and 1% of olive, peanut, teaseed or petrolatum oils were not injurious to squash plants.

Garner, Walter.

THE OXIDATION OF WOOL-COMBING OILS.

Textile Mfr. 62, 370-1(1936); C.A. 31, 897(1937).

Processed peanut oil is mentioned as a desirable substitute for olive oil. A method of processing olive and (or) peanut oil is described to render them insensitive to iron salts which may be present and cause trouble in the storage of tops. The amt. of linolic acid present does not altogether account for the differences in the oxidizability of vegetable oils. Fe, Co and Mn salts are inherent for various reasons, and act as catalysts. In the Mackey test, with com. olive and peanut oils, ignition takes place after about 2 hrs. while with the processed oils, only a temp. of 214° F. develops.

Gautier Marcel.

UTILIZATION OF VEGETABLE OIL AS FUEL IN DIESEL ENGINES.

Tech. moderne 23, 251-6(1931); C.A. 26, 278(1932).

Peanut, palm and castor oils and karite butter were compared with mineral oil. As a whole these oils are satisfactory as fuel but their cost is prohibitive. Detailed tables give the results of the tests.

Gautier, M.

VEGETABLE OILS AND THE DIESEL ENGINES.

Rev. combustibles liquides 13, 129-36(1935); C.A. 29, 4612(1935).

Since a previous study showed that Diesel engines of 5-20 h.p. could run on peanut oil, further tests with peanut, palm and linseed oils were made. Various tables and diagrams are given showing comparison with gas oil. The results were encouragingly favorable, 6 reasons being cited. The motor had a mech. injector, with the usual injection point of 11° advanced to 12°.

Genot, Cl.

FATS, OILS AND WAXES IN CURRENT USE IN PHARMACY.

J. Pharm. Belg. 5, 73-5, 89-92, 105-7, 121-4, 137-9, 153-6, 173-6 (1923); C.A. 17, 1861(1923).

G. discusses the source, methods of extn., properties, compn., tests, adulterations and uses of the following: cacao butter, expressed oil of laurel, expressed oil of almonds, olive oil, colza oil, peanut oil, linseed oil, poppy-seed oil, castor oil, croton oil, sesame oil, beeswax, spermaceti, lard, wool fat, cod-liver oil, paraffin(solid), paraffin (soft) and paraffin (liquid).

Göllner, K.
WATER-SOLUBLE OILS.
Magyar Gyógyszerésztud Társaság Értesitője 6, 452-9(1930); C.A. 25; 2519 (1931).

Sulfonation expts. were made on olive, sesame, peanut, rape and neat's-foot oils and on pure white olein. Sulfonated neat's-foot oil gives the finest emulsion. It is suitable for cosmetic and skin-treating purposes. Cf. C.A. 25, 557.

Grailly, R. de and Daron, P.
THE MODE OF EVACUATION OF THE GALL BLADDER AFTER INGESTION OF CERTAIN OILS.
Compt. rend. soc. biol. 109, 379-82(1932); C.A. 26, 3293(1932).

The evacuation was detd. by observing the modification of the radiographic shadow. Peanut oil showed a two-phase action: increase in tension followed by slow evacuation, completed in 3.5 hrs. Castor oil acted similarly to peanut oil except that total evacuation did not occur in 4 hrs. Paraffin oil had no effect. In general, fats cause a transitory increase in the size of the gall bladder followed by a slow decrease.

Kao, Lu-Teh
LUBRICATING OIL AND FOOD FROM PEANUTS.
J. Chem. Eng. (China) 2, 112-16(1935)(in Chinese); C.A. 30, 2742(1936); cf. preceding abstr.

Peanuts are shelled, dried at 70-80° for 5-6 hrs., allowed to stand for 8 hrs. and then sepd. from the skin, which has become brittle. The peanuts are then ground and pressed in a modern oil press, with gradual increase in the pressure. The filtered oil, after partial oxidation, becomes viscous and takes on the properties of lubricating oil. This oxidation is carried out best by blowing air into the oil at 200° for 8 hrs. The product so obtained has d.0.945, viscosity 936° Saybolt, a yellowish brown color, 0.011% acidity, 2.27% residual C (left in the reaction vessel) and no corrosive action on Cu. The meal left after pressing out the oil is clean and has a good taste. After crushing, grinding and sieving, a white powder high in nutritive value and suitable as a substitute for wheat flour is obtained.

Keeney, Edmund L., Pierce, J. A., and Gay, Leslie N.
ADRENALINE IN OIL
Arch. Internal Med. 63, 119-42(1939); C. A. 33, 5064(1939)

Injection of a suspension of adrenaline base in peanut oil (1 mg./cc.) is shown by clinical results and by the hyperglucemic effect to cause a slow but prolonged adrenaline effect.

Kehren, Max
THE BEHAVIOR OF NEUTRAL OILS IN THE MACKEY APPARATUS.
Melliand Textilber. 18, 908-11(1937); C. A. 32, 1939(1938).

The results of the Mackey test of castor, olive, peanut, cottonseed, seybean and poppyseed oils are given. Several samples of each oil were tested. In general the oils with the lowest acid value give the best results. To insure against spontaneous combustions K. suggests including the Mackey test in the specifications for spinning oils.

Lege, Edouard

THE TRANSFORMATION OF OLEAGINOUS MATTER INTO MIXTURES OF HYDROCARBONS.
Compt. rend. 206, 1264-6(1938); C. A. 32, 5649(1938).

Seeds are first heated at about 600° so that a pure coke remains and the volatile matter is condensed. When the latter is again subjected to heating, 75% is converted into hydrocarbons. Data are given of the chem. and elementary analyses of peanut oil and of of the primary distn. products.

Li, Er-Kang and Chow, Shing-Chien.

PREPARATION OF GASOLINE FROM CALCIUM SOAP (OF PEANUT OIL).
Chinese Industry 1, 1327-34(1935); C. A. 29, 6454(1935).

Peanut oil is converted into its Ca soap by heating with 14-15% of lime under 40-50 lb. pressure in an autoclave for 12 hrs. Glycerol is recovered as by-product. The Ca soap, dried at 105° for 3 hrs. and subjected to dry distn., gives a greenish yellow, slightly fluorescent crude oil having sp. gr. 0.8129; yield about 70% of the peanut oil by vol. Fractionation gives 21% light oil, 59.5% middle oil and 12.0% heavy oil. These fractions are similar to gasoline, kerosene and lubricating oil, resp.

Lister & Company Ltd. and Garner, Walter

TREATING TEXTILES.
Brit. 493,275, Oct. 4, 1938. : C. A. 33, P 1965(1939).

Textile materials comprising animal hairs, e. g., wool, angora, mohair, shoddy or other fibers, e. g., silk, rayon, cotton and jute, or mixts. thereof, are treated in loose form, or as sliver, yarn or fabric or in intermediate stages of processing, with arachis oil (I) modified by oxidation and (or) polymerization. The I may be mixed with textile oils, i. e., natural or artificial solid and (or) liquid esters and glycerides of fatty acids and (or) the free fatty acids prepd. from such oils. Among examples, (1) refined I is maintained at 100-200° and a stream of air passed therethrough, and (2) I is polymerized by being heated at 200° in vacuo or in an open vessel for 1-8 hrs. or at 300° in vacuo for 0.5-3 hrs. Cf. C. A. 33, 1517.

Lloyd, L. L.

OILS USED IN THE TEXTILE INDUSTRIES.
J. Textile Inst. 13, 101-5(1922); C. A. 16, 3546(1922).

Olive oil, when used in the worsted industry, has fewer objectionable properties than other non-drying oils but the free fatty acids of olive and other oils oxidize more readily than the neutral oil, though even the neutral oil will become oxidized in time to a viscous mass. This oxidation is aided by elevation of temp. and by exposure to direct sunlight. Oils of free fatty acid content attack the steel pins of the comb. Oxidation of olive oil is increased by the presence of bacteria, fungi and enzymes which are always present in wool or textiles. Tea seed oil is very liable to produce faulty dyed pieces. Nut, arachis or tea seed oil should be used only in self-contained works where the period from top to finished product is relatively short, but should not be used in case the length of this period or time of storing are unknown factors. Wool fat distd. in superheated steam under reduced pressure yields a neutral product more fluid than neutral wool fat but less fluid than olive oil. It may be used in wool or worsted operations.

Mailhe, A.

PREPARATION OF MOTOR FUEL FROM VEGETABLE OILS.

J. usines gaz. 46, 289-92(1922); C. A. 17, 197(1923).

M. explains how vegetable oils can be transformed easily by catalytic means into gaseous and liquid hydrocarbons with production of small amts. of CO_2 and CO. The gaseous products are essentially forms of H, CH_4, C_3H_8 and C_4H_{10} and a small amt. of ethylenic hydrocarbons. Gas from peanut oil analyzed CO_2 6, CO 5, C_nH_{2n} 6, C_nH_{2n} plus$_2$ 31, CH_4 38 and H 15%. The liquid products, after neutralization and hydrogenation, are made up of a mixt. of formenic and cyclic hydrocarbons, in which are found considerable proportions of benzene, toluene and m-xylene. They form a motor fuel with a very agreeable odor, similar to Borneo petroleum.

Mailhe, A.

THE CATALYTIC DECOMPOSITION OF VEGETABLE AND ANIMAL OILS.

Chaleur et industrie 3, 1144-6(1922); Chimie de industrie 8, 1292 (1922); C. A. 17, 1159(1923).

Various oils were passed over a catalyzer (electrolytic Cu mixed with a dehydrating agent) heated to 550-650°, and yielded gases, liquid decompn. products distg. below 220°, and a residue which was subjected a 2nd time to catalysis. The liquid products of decompn. contain a small amt. of acids and a large proportion of unsatd. compds. By hydrogenation in the presence of Ni at 180°, M. obtained a colorless liquid with a gasoline odor, which was rectified. Linseed oil gave 2 main fractions which yielded $C_6H_5NO_2$ and $C_6H_3Me(NO_2)_2$, m. 70°, on nitration. Under the same conditions colza oil gave $C_6H_4(NO_2)_2$, $C_6H_3Me(NO_2)_2$, and trinitro-m-xylene. The decompn. products of colza oil consisted of methane hydrocarbons, small quantities of cyclohexane-hydrocarbons, and especially aromatic hydrocarbons. Arachis oil behaved in about the same manner as colza. Shark oil gave a mixt. of methane and cyclic hydrocarbons in which were identified C_6H_6, C_7H_8, cyclohexane, and methylcyclohexane. The gases always contain acrolein due to the decompn. of the glycerol, but consist mainly of CH_4(38%,) methane hydrocarbons (31%), and H_2(15%).

Mailhe, A.

PETROLEUM FROM PEANUT OIL.

Chaleur et industrie 5, 3-5(1924); C. A. 18, 1744(1924).

M. Briefly outlines some of his previous results (C. A. 15, 3739; 16, 3304, 4077; 17, 197, 3783; 18, 577) and describes new expts. A mixt. of 300 g. peanut oil and 50 g. anhyd. $MgCl_2$ was gradually heated in a Cu kettle with a delivery tube at the top. At 300-50° the liquid boiled, with formation of a small amt. of fatty acids entrained by the water vapor. Distn. proceeded regularly to 450°, with continuous production of gas contg. HCl due to formation of Mg oxychloride. The compn. of the gas towards the middle of the distn. was: CO_2 4, CO 9, C_nH_{2n} 7, CH_4 16, H_2 64%. The distillate was redistd. and the residue above 210° (contg. undecompd. fatty acids and ketones) put back in the reaction kettle to complete their decompn. The resultant liquid was treated with dil. NaOH and washed with H_2O, giving a total yield of 198 g. (=66%) of neutral transformation products, and some

charcoal impregnated with heavy oil which did not distil. Fractionation showed the liquid to consist of hydrocarbons of the CH_4 and C_2H_4 series, and to give petrolic ether, gasoline, kerosene, heavy oils, lubricating oils (Engler viscosity of 6° at 20°) and solid products analogous to vaseline, which were converted into a paraffin-like substance by heating several hrs. with fused $ZnCl_2$. A small amt. of undecomposed ketones remained, including caprinone, $(C_8H_{17})_2$- CO, m. 48°, and giving Kutscheroff's reaction with alc. vanillin soln. and H_2SO_4.

Mailhe, Alphonse

THE CATALYTIC TRANSFORMATION OF VEGETABLE AND ANIMAL OILS INTO PETROLEUM.

Ann. Chim. 17, 304-32(1922); C. A. 16, 3304(1922).

The vapors of linseed oil when passed through a mixt. of MgO and electrolytic Cu at 550-600° gave off much gas contg. 6% CO_2, 9% CO, 54% C_nH_{2n} and C_nH_{2n+2} with 31% H_2. Above 600° the ethylenic compds. are converted into H_2 and other hydrocarbons. The liquid product is of a brown-mahogany color and strong odor and has an acid reaction. On distn. it starts to b. 40°, the major portion distg. at 40-150° and a second fraction at 150-220°. The residue is passed again over the catalyst and further quantities of the products are obtained. The fraction b. under 150° was treated with dil. NaOH and washed and it was found that the clear liquid reacted readily with H_2SO_4. When hydrogenated with a Ni catalyst at 180° a colorless liquid, very inflammable and of agreeable odor, was obtained. Products distg. below 70° disappeared during hydrogenation because of technical difficulties. The fraction b. 100-5° on nitration gave $PhNO_2$ and $C_7H_6(NO_2)_2$. The portion of the oil which resisted nitration, when passed over Ni at 350°, gave off H_2 and C_6H_6 was formed. M-xylene and cyclohexane also were formed. Rapeseed oil when passed over a Cu-Al_2O_3 catalyst at 550-650° gave CH_2:CH-CHO, H_2O, non-condensible gases of high illuminating and calorific power, and H_2. The high boiling residue obtained from the distn. of the products was passed again over the catalyst. The fraction b. below 150° had a very agreeable odor of gasoline, gave only a slight coloration when treated with H_2SO_4, d_{23} 0.7684. C_6H_6 cyclohexane, aliphatic hydrocarbons, C_7H_8 and C_8H_{10} were found. The fraction b. 150-250° when hydrogenated over Ni gave a colorless liquid, d_{23} 0.8390. All of the fractions (5°) of the mixt. undergo partial nitration when treated with H_2SO_4-HNO_3. They contain large amts. of aromatic, and aliphatic and small amts. of ethylenic compds. Peanut oil (A) was passed over the catalyst at 600° and gaseous and liquid products were obtained. The liquids were passed over Ni in the presence of H_2. C_6H_{14}, C_6H_6 and C_7H_8 were formed. The acids resulting from the decompn. of A were reduced over Ni at 200-220°. Caprylic acid was present. 1360 g. oil when catalyzed at 600° gave 238 g. of oil b. below 150°, 187 g. b. 180-260° and 45 g. residue with 25 g. acid products. 329 l. of gas were formed per kg. of oil treated. Shark oil was catalyzed over the same catalyst and C_6H_6, C_7H_8, m-C_8H_{10}, acetylenic compds. hexahydroxylene & $C_{10}H_{22}$ were produced. The acids formed absorbed Br readily. Enanthylic acid, enanthone,

pelargonic acid and aluric acid were found. When triacetin (B) was passed over the catalyst at 550° an acid soln. containing Me_2CO was formed and the gas contained CH_2:CHCHO and CO_2. B is completely sapond., by the H_2O formed and the C_3H_5-$(OH)_3$ is destroyed. Butyrin behaves like B. Isovalerin gives CH_2:CHCHO, H_2O, hydrocarbons, H_2 and unsatd. compds. --which after hydrogenation resemble motor spirit-- and myristic acid. Palm oil when catalytically decompd. at 600-650° undergoes a decompn. similar to that of peanut, rape-seed and linseed oils, yielding similar products. The production of hydrocarbons from the catalytic decompn. of glycerides is evidently due to the decompn. of the acids resulting from the splitting of the fats. Consequently the study of the decompn. of the free acids was taken up. $C_2H_4O_2$ was decompd. at 600° in contact with the catalyst, and H_2O, unchanged acid, Me_2CO and a gas contg. 18.9% CH_4, 45.3% CO_2, 12.6% CO, and 25.2% H_2 were formed. Me_2CHCO_2H decompd. at 600-630° gave isobutyrone, H_2O, and a gas contg. $MeCH{:}CH_2$ $Me_2CHCH_2CO_2H$ (C) undergoes a partial decompn. when passed over the catalyst. Isobutylene and isovalerone (D) were shown to be present among the gaseous products. To throw light on the change which C undergoes D was decompd. separately and among the products resulting after the gases were passed through Br, $MeCHBrCH_2Br$ and Me_2CBrCH_2Br were found. Pelargonic acid undergoes more pronounced decompn. when catalyzed than do the acids above mentioned. The products b. below 150° were readily hydrogenated. C_6H_6 and C_7H_8 were identified as well as aliphatic compds. Nonylene also was obtained. Oleic acid was decompd. at 600° and the products when hydrogenated contain C_6H_{14}, C_7H_{16}, C_6H_6, C_9H_{20} and m-xylene. The yield of motor fuel obtained from oleic acid was 34%. A mixt. of linolenic and linoleic acids gave products similar to those mentioned in connection with oleic acid. Pelargonic acid furnished only a small amt. of valuable products but oleic and linoleic acids gave notable amts. of motor fuel and aromatics. The procedure indicated for prepg. motor fuel from these products is: (1) dehydration and dehydrogenation by passage over a catalyst; (2), sepn. of volatile products from the higher boiling fractions, and hydrogenation of the lighter oil after neutralizing the acids present. Important amts. of illuminating gas are obtained, the calorific power of which is 12,000 cal. per m. The origin of petroleum in nature is discussed. Animal and vegetable oils may have undergone a decompn. under the influence of the earth's heat, in contact with oxides, carbonates and silicates of metals, and gaseous products as H_2, CO, CH_4, ethylenic and satd. compds. resulted. Under the influence of the H_2 the unsatd. substances were converted into satd. compds.

Mailhe, Alphonse

CATALYTIC DECOMPOSITION OF ARACHIS OIL.

Bull. soc. chim. 31, 567-70(1922); C. A. 16, 4077(1922).

By heating arachis oil in the presence of Al and Cu catalyzers a gas and a brown liquid are obtained, while at the same time acrolein and H_2O are formed. The liquid was sepd. into 2 parts, 1 distg. between 60° and 150°, the other distg. from 150 to 270°. Each portion was treated with dil. soda to neutralize the acid products and then hydrogenated with Ni at 180 to 200°. Colorless liquids of agreeable odor were obtained. The first portion was sepd. into 5° fractions and the d_{11} detd.; this varied from 0.6840 to 0.7873. The fractions up to

b.p. 70° consist of methane hydrocarbons, those above 70° of aromatic hydrocarbons, and that b. 85-90° when treated with fuming HNO_3 gave nitrobenzene. The fraction 110 to 120° when treated in the cold with a H_2SO_4, HNO_3 mixt. gave dinitrotoluene and the fraction 135 to 140° gave nitro derivs. The hydrogenated liquid distg. from 150 to 270° was fractionated into 5° fractions with d_{11} 0.7951-0.8387. Each fraction was partially nitrated when treated with fuming HNO_3. The acid products formed by neutralization with soda were treated with HCl and yielded a brown liquid of disagreeable odor which absorbed Br. By hydrogenation with Ni at 220° these acids are satd. and on fractionation give portions b. 160-250° and having d_{11} 0.9115-0.8491. The gas formed during the original decompn. had the compn. CO_2 6, CO 5, ethane and CH_4 38, H 15, ethylenic hydrocarbons 5, methane hydrocarbons 31%. The yield from 1360 g. of oil when passed over the catalyzer 3 times was 425 g. of light products. The soda treatment followed by hydrogenation gave 238 g. of liquid b. above 150° and 303 g. b. above 180°, 65 g. b. 180-260° and 45 g. of residue. The gas produced was 329 l. per kg. of oil treated.

Mailhe, Alphonse.

THE PREPARATION OF GASOLINE FROM VEGETABLE AND ANIMAL OILS.

Compt. rend. 177, 329-31(1924); C. A. 18, 3709(1924); cf. C. A. 17, 187; 18, 1744.

Rape, peanut, castor and karite oils and also shark and whale oils and tallow when treated with $ZnCl_2$ give products identical with those obtained from colza oil. When rape oil is heated with 10% $ZnCl_2$ decompn. soon results and H_2O, CH_2:CHCHO and volatile products are formed. The condensate is generally acid. The ds. of the fractions b. 110-310° are tabulated. Acetylenic and ethylenic compds. are present. The fraction boiling above 310° when treated with $ZnCl_2$ gave viscous oils and vaseline. $CaCl_2$, $MgCl_2$, $BaCl_2$ and NaCl behave similarly. When butter of karite was heated between 400° and 500° with $CaCl_2$ an oil, d_{20} 0.7158, and viscous oils were produced. HCl is evolved when $MgCl_2$ is used. It is easy to transform fatty compds. into gasoline by simultaneous dehydration and cracking in the presence of inexpensive chlorides.

Manzella, G.

PEANUT OIL AS DIESEL-ENGINE FUEL.

Energia Term. 3, 153-60(1935); Chimie & industrie 35, 69; C.A. 30, 2347 (1936).

With a view to studying the possibility of using peanut oil in Diesel engines comparative tests were carried out with heavy mineral oil and with peanut oil on a 2-cycle, 12 h.p., 520 r. p. m. engine. Observations of ignition conditions and of consumption at full load and at reduced load lead to the following conclusions: Operation with peanut oil offers no difficulty or drawback. The consumption of peanut oil is higher than that of mineral oil at normal loads, but it is lower at reduced loads in spite of the fact that peanut oil has a lower calorific value than mineral oil. Use of peanut oil therefore seems particularly advantageous in motors operating over a wide range of loads; the efficiency in all cases is greater than with mineral oil. Ignition is somewhat retarded as compared with mineral oil, but has the advantage of acting more progressively and consequently of decreasing the max. pressure.

Mathot.
UTILIZATION OF VEGETABLE OILS AS MOTOR FUELS.
Bull. mat. grasses inst. colonial Marseille 1921, 116-28; C.A. 17, 197 (1923).

Palm oil, cottonseed oil, and heavy petroleum were used as fuels in semi-Diesel engines of five different makes. A thermal efficiency of 24.5% corresponding to 278 g. of cottonseed oil per B. h.p.-hr. was obtained. Suggestions of changes in design necessary to adapt an engine to vegetable-oil fuels are given. The physical properties and ultimate analyses of palm, peanut, cottonseed, and sesame oils are reported.

Mathot, R.E.
VEGETABLE OILS FOR INTERNAL-COMBUSTION ENGINES.
Engineer 132, 138-9(1921); C.A. 15, 3735 (1921).

Palm, cottonseed, peanut and sesame oil were used. So-called semi-Diesel engines, whether they be of the 2-or the 4-stroke cycle type, will work perfectly well with vegetable oils.

Nakagawa, Bunji
COMBINATIONS OF RAW MATERIALS FOR TOILET SOAP.
J. Soc. Chem. Ind., Japan 34, Suppl. binding 22-7, 28-31(1931); C.A. 25, 1696(1931).

Soaps of 8 different oils were mixed in proportions of 10-80% with a soap consisting of 80% Na tallow soap and 20% Na coconut-oil soap and the lathering no. (L. N.), lathering vol. (L. V.), lathering coeff. (L. coeff.) and rate of lather extinguishment detd. L. coeff. = L. N. X L. V., and the rate of lather extinguishment = [[(L. coeff. at 1 min. after shaking) -(L. coeff. at 5 min. after shaking)] /(L. coeff. at 1 min. after shaking)] X 100. Na palm-oil soap (I) has a good effect upon lathering. Hardened soy-bean oil soap (II) of 67.7 I no. has a better effect at 40° than at 20°, where it shows a reverse tendency. A Na lard soap (III) has a good effect on the L. coeff. at the start, but the rate of lather extinguishment rises with the increase in amt. of this soap. A 40% mixt. is the best for lathering power. Na hardened fish-oil soap (IV) decreases the L. coeff. The Na soap (V) of Chinese vegetable tallow has not much effect on the L. coeff., but the rate of lather extinguishment is larger. At 20° the L. coeff. decreases. Na castor-oil soap (VI), Na peanut-oil soap (VII) and K tallow soap (VIII) all have a good effect upon the lathering, but VI is the most desirable. The soly. of mixed soap was measured in an attrition app. composed of an endless rubber band rotating at 1086 cm. per min. and dipping into a water bath at 40° and 20°. A soap cake 2 X 3 X 2 cm. was fastened and weighted with 135 g. so that the rubber band could rub it. The duration of the operation was 10 min. at 40° and 20 min. at 20°, and by weighing back the soap the attrition was detd. The degree of attrition is designated "rubbing soly." and is calcd. by the formula: rubbing soly. = 100 X [soap by attrition(g) ÷ rubbing surface ($cm.^2$)]. The rubbing soly. of Na tallow soap mixed with 20% Na coconut-oil soap is smaller than that of the former alone but increases with increase of the latter. The mixt. with I or II does not increase the rubbing soly. In the mixt. of III the rubbing soly.

increases with increase in amt. of this soap; in mixts. of IV it decreases with increase of this soap. In the case of V the rubbing soly. tends to decrease, and this effect is greater at 20° than at 40°. A 2.5% mixt. of VI increases the rubbing soly., as do also VII and VIII, 15% of VII being equal to 2.5% of VI. The relative hardness of the mixed soaps was detd. from the distances 2 5-cm. metal points 2 and 3 mm. in diam. (weighted to a total of 300 and 600 g., resp.) penetrated into the soaps, a homogeneous curd soap being the standard of comparison. The hardness of mixed Na tallow and Na coconut-oil soap increases with the increase in the amt. of the latter until, with 40% coconut-oil soap, the soap is unsuitable for toilet use. I and II (I no. 67) have a tendency to soften the mixed soap, I having a greater effect than II. IV (I no. 22.3) in lower percentages produces a slight softening in the mixt., but when 50% is used, it hardens the product. V increases the hardness as its amt. is increased. VII, VIII and VI (effective in this order) soften the mixt. according to the amts. added. Conclusion: palm oil, hardened soy-bean oil and Chinese vegetable tallow can generally be used as substitutes for tallow, and the most desirable for the combination are castor oil, peanut oil and the K soap of tallow.

Oestermann, H.

SELF-IGNITION OF OILED WOOL.

Leipzig. Monatschr. Textil-Ind. 43, 162-3, 210-1, 258-9(1928); C.A. 22, 4829(1928).

Tests with Mackey app. confirm the superiority of olive and peanut oils from the standpoint of hazard of self-ignition of the fiber, and the dangerous catalytic action of Mn and Fe resinates and similar driers. Of inhibitors for self-ignition S showed special effectiveness. Self-ignition is rare in wool contg. over 10% moisture

Ping, K.

CATALYTIC CONVERSION OF PEANUT OIL INTO LIGHT SPIRITS.

J. Chinese Chem. Soc. 3, 95-102(1935); C.A. 29, 4612(1935).

Peanut oil on heating with 1% $AlCl_3$ by wt. decomposes to give 25% by vol. of light oil which is water white and free from unstable, unsatd. compds. The residue can be cracked again to yield 20% more of light oil.

Ping, K.

CRACKING OF PEANUT OIL.

J. Chem. Eng. China 3, 201-10(1936); C.A. 31, 238(1937).

Peanut oil on cracking in the liquid phase with 1% $AlCl_3$ under atm. pressure at 250-400° in a lab. batch process of 15-gal. capacity produces 27% refined gasoline (boiling up to 200°), 31% refined illuminating oil (b.200-300°), together with gas, coke and distn. residue, all of good fuel value. The gasoline obtained is inferior in knock rating, but the illuminating oil gives excellent results.

Raubenheimer, O.
PEANUT OIL, ITS USE IN PHARMACY.
Midland Druggist 52, 312-3(1918); C.A. 12, 2229(1918).

Peanut oil may substitute sesame oil in linimentum ammoniae, U.S.P. (peanut oil 750, aq. NH_4OH 250 cc. yielding a snow white liniment), and cottonseed oil in linimentum camphorae, U. S. P. A 20% soln. of camphor in peanut oil obviates the stickiness in using cottonseed oil, and soln. takes place rapidly.

Rost, E.
PHYSIOLOGICAL AND PHARMACOLOGICAL EXAMINATION OF HYDROGENATED VEGETABLE OILS (COTTONSEED, ARACHIS, LINSEED, AND SESAME OILS) AND OF UNHARDENED SESAME OIL.
Arbb. Reichs-Gesundh.-Amt. 52, 184-209(1920); C.A. 16, 3005(1922).

The hardened oils are similar in their physiol. action to the unhardened oils, and exhibit no harmful properties; they should contain practically no Ni and As; the minute traces of Ni always present, and those of As which occasionally occur cannot be regarded as injurious.

Schmidt, A. W.
USE OF VEGETABLE OILS AS FUEL FOR INTERNAL-COMBUSTION ENGINES.
Tropenpflanzer 35, 386-9(1932); Chimie & industrie 29, 74; C.A. 27, 1735(1933).

Vegetable oils are rather heavy and are suitable for use only in Diesel and semi-Diesel engines. Tests with peanut, soybean and palm oils in a small Diesel engine showed that the engine ran satisfactorily, though some difficulty was sometimes experienced in starting; this could be obviated by starting on mineral oil. The engine developed considerably less power with vegetable oils (15 h.p.) than with gas oil (24 h.p.); this was due partly to the lower calorific value of the oil and also to the fact that the higher viscosity prevented proper atomizing and rendered combustion imperfect.

Schwartze, Erich W., Bur. Chemistry, U. S. Dept. of Agr.
SOME OBSERVATIONS UPON THE BEHAVIOR OF A FIXED OIL (PEANUT OIL) INJECTED INTRAPERITONEALLY.
J. Pharmacol. 17, 115-9(1921); C.A. 15, 1762(1921).

Peanut oil, injected into the peritoneal cavity, is apparently harmless and is slowly absorbed. This problem merits a more detailed study.

Shimura, Y. and Takagi, K.
HAIR OIL.
Brit. 312,568, Oct. 23, 1928; C.A. 24, P 984 (1930).

A non-drying vegetable oil such as castor, olive, camellia, peanut, coconut, soybean, rapeseed, cottonseed, or thea-sesanqua oil is agitated and heated with EtOH or MeOH and a small proportion of ether. The mixt. is allowed to stand 7 days, washed with water, and distilled in vacuo to obtain an oil of lower viscosity than the original oil.

Spiers, S. and Bittor, J. L.

APPLICATION OF SYNTHETIC ESTERS OF FATTY ACIDS TO TEXTILE FIBERS.

Textile Recorder 43, No. 516, 68-9(1926); C... 20, 2586(1926).

The use of neutral ethyl esters of the fatty acids of coconut or earthnut oil, with 15% of free fatty acids, is recommended for oiling scoured wool in combing. "The ester supplies the cheapest and least objectionable non-drying oil for the combing operation." Olive-oil fatty acid ester is suggested for carding fine counts of wool; or a mixt. of 1 part of oleic acid with 1.5 parts of olive oil ester and 1.5 parts of fatty acid, for coarser counts.

Tatti, E. and Sirtori, A.

USE OF PEANUT OIL IN INJECTION, HIGH-COMPRESSION, HIGH-SPEED AUTOMOBILE MOTORS.

Energia termica 5, No. 7, 59-64(1937); C.A. 32, 2318(1938); Chimie & Industrie 38, 883.

Physicochem. and dynamometric detns. and practical utilization tests were carried out on a peanut oil, and the results were compared with those obtained with an A. C. I. P. gas oil that is extensively used in Diesel motors in Italy. Peanut oil has a rather high ignition temp.; if the oil cannot be preheated and atm. conditions are such that the temp. of the oil is below 10°, its use becomes impossible. The viscosity, especially at low temps., is high, and atomization is difficult. Formations of incrustations is attributable chiefly to the fact that oil injected in a cold motor is deposited on the walls in the liquid state and is incompletely oxidized, leaving a considerable residue. Peanut oil attacks Cu slightly, so that Cu piping must be avoided. When continuous use of this oil in a preheated motor is intended, it will be advisable to increase the injection pressure, to vary suitably the size of the holes of the injector and to adjust the pump. The odor of the exhaust cannot be avoided, and the oil should therefore not be used on vehicles which must travel in close formation (military convoys).

Walton, John

THE FUEL POSSIBILITIES OF VEGETABLE OILS.

Gas Oil Power 33, 167-8(1938); C.A. 33, 833(1939).

A discussion of data derived from operating a six-cylinder Diesel engine on palm oil, cottonseed oil, ground nut oil and soybean oil. Other vegetable oils can probably be used. Oils with low I no. apparently give the smallest engine residue.

Yuill, Alex F. and Bhate, Sadashiv R.

FERTILIZER.

Brit. 366,969, Nov. 6, 1930; C.A. 27, P 1080(1933).

A solid nitrogenous residue, suitable for use as fertilizer, is obtained from the putty-like mass remaining on the cloths when crude peanut oil is filtered by mixing with caustic alkali soln., boiling with alkali chloride soln., and removing the oil layer.

Basore, Cleburne A.
SOME POTENTIAL INDUSTRIAL OPPORTUNITIES IN THE UTILIZATION OF AGRICULTURAL WASTES IN ALABAMA.
Bull. Alabama Polytech. Inst. 34, No. 12, 14 pp. (1939); C.A. 33, 7430(1939).
Possibilities are suggested of the utilization of wastes from corn, cereals, peanuts, cotton and wood. The application of mineral resources of the state in the utilization of these wastes is discussed.

Browning, Philip E.
THE FERTILIZING VALUE OF SOME HOUSEHOLD WASTES.
J. Ind. Eng. Chem. 9, 1043 (1917); C.A. 11, 3368 (1917).
A table gives the % K_2O and % P_2O_5 in the ash of banana stalks, banana skins, grapefruit skins, orange skins, lemon skins, apple skins, canteloup rinds, raw white potato skin, boiled sweet potato skin, pea pods, cucumber skins, string bean strings and stems, tea leaves, coffee grounds (N content given), lamb chop bone (CaO content given), burned egg shells (CaO content given), tobacco, peanut shells, peach stones and peach skins.

Emley, Warren E. Bur. Standards.
XYLOSE FROM COTTONSEED BRAN.
Ind. Eng. Chem., News Ed. 6, No. 21, 3 (1928); C.A. 23, 821 (1929).
Brief account of exptl. work on the hydrolysis of cottonseed bran or peanut shells for the production of xylose and its possible uses.

Fraps, G. S.
DIGESTION EXPERIMENTS.
Texas Agr. Expt. Sta., Bull. 291, 16 pp. (1922); C.A. 17, 3552 (1923).
The feeding value of various feeding stuffs depends upon bulk, palatibility, ash content, suitability to the animal, vitamin content, digestible protein, and productive value. Tables are given showing the results of feeding tests. The following feeds are used: alfalfa hay, alfalfa meal, delinted cottonseed hulls, and those with the lint on, sorghum (red top), corn bran, Darco (sorghum), milo both whole and ground, various oats products, peanut hulls and various beans.

Fred, E. B., Peterson, W. H., and Anderson, J. A.
PRODUCTION OF ACETONE, ALCOHOL, AND ACIDS FROM OAT AND PEANUT HULLS.
Ind. Eng. Chem. 15, 126 (1923); C.A. 17, 848 (1923).
Acetone, alc., and acids may be produced from hydrolyzed oat hulls, peanut hulls, and corn cobs. The hulls are hydrolyzed with 2% H_2SO_4 for 2 hrs. at 15 lbs., and the soln. is then neutralized with $CaCO_3$. Oat hulls yield 26.5% reducing sugar, and peanut hulls 7.6%. Peptone and Na phosphate were added to the diluted sirup, and the solns. inoculated with B. acetoethylicum. The reducing sugars of both materials are completely fermented, oat hulls yielding, on the basis of 100 lbs., 3.9 lbs. acetone, 7.2 lbs. C_2H_5OH, and 1.4 lbs. volatile acids. Peanut hulls give a much lower yield. Lactobacillus pentoaceticus did not completely ferment the sugar.

Fuchs, C. S.

THE REFUSE OF THE PEANUT INDUSTRY.

Chem. Ztg., 35, 358-9; C.A. 5, 2403 (1911).

There is little food value in the peanut shucks alone, as they contain only 3-4% of crude fat and 6-8% of protein, but 70% of which is digestible. The inner red skins which are removed in the oil industry are richer in protein 14-17% and fat 14-18%, and these, mixed with the shucks and some waste nuts such as often sep. in the cleaning process, might make a valuable cattle food. Further work with this "peanut bran" should be done to det. its practical feeding value.

Guillon, Henri

THE UTILIZATION OF PEANUT HULLS AS FUEL.

Bull. mat. grasses inst. colonial Marseille 16, 104-9 (1932); C.A. 26, 3899 (1932).

The final solution of the problem of disposing of the peanut hulls from an oil mill of a 100 tons per day capacity was to burn the hulls under the boiler that supplied power for the mill. The characteristics of the hulls are: very low moisture, 80% volatile matter, 1-2% ash, a low calorific value of 4.1 calories, an ash fusing at 1150° and a bulk density of 0.08. Because of these characteristics the solution of the problem presented unique difficulties. The hulls must be burned with negligible loss of combustible in the ash and without a large excess of air or loss of unburned gases. The hulls cannot be fired directly by hand as large quantities are carried up the stack. The method of firing must lend itself to the variations in operating conditions of the mill. Because of the low bulk density a mech. stoker is used. Although the content of ash is small it melts at a low temp. and reacts chemically with the refractory. The main difficulty arises from the large amt. of volatile matter. Because of this the ratio of primary to secondary air provided must be 10:1. The design of the entire furnace, the method of stoking and of admitting the proper amts. of primary and secondary air are discussed and the operating characteristics are described in detail.

Hall, W. L., Slater, C. S. and Acree, S. F.

PRELIMINARY INVESTIGATIONS UPON TWO CELLULOSIC WASTES AS SOURCES FOR XYLOSE.

Bur. Standards J. Research 4, 329-43 (1930); C.A. 24, 2991 (1930).

Methods now in use on a semicom. scale have been developed for removing the loose and combined ash from peanut and cottonseed hulls and recovering xylose by acid hydrolysis under such conditions as to avoid destruction of the cellulose fibers. From peanut hulls, most of the ash is sepd. in the fraction passing through a no. 20 sieve. The combined alk. ash is removed down to 0.15-0.4% by leaching with cold dil. mineral acid. Preliminary quant. expts. show that about 0.5 of the furfural-yielding constituents are hydrolyzed by 0.15-0.35 N mineral acids under 10 lb. steam pressure but no sugars have yet been

crystd. from the hydrolysate. Cold 42% HCl gives complete hydrolysis but chars the fibers. Cottonseed-hull bran, after extn. of gums by cooking with H_2O for 2 hrs. under 10 lb. steam pressure and removal of combined ash with cold 0.12 N H_2SO_4, is hydrolyzed by cooking with 0.16 N H_2SO_4 for 2 hrs. under 10 lb. steam pressure. The filtrate, which may be used for several hydrolyses, is recooked with a little decolorizing carbon for 1 hr. at the same pressure to complete hydrolysis, concd. to 0.5 its original vol., neutralized to pH 2.8-3.0 with satd. $Ba(OH)_2$, decanted from the $BaSO_4$ and concd. to a d. of 1.35 at 40°. Xylose amounting to a 9% yield of the bran seps. overnight as light brown crystals contg. 2% ash. Recrystn. from H_2O, H_2O and alc., or H_2O and AcOH, gives a sugar with only a trace of ash.

Hunter, Walker F., Jr. and Best, R. W.
THE DESTRUCTIVE DISTILLATION OF PEANUT HULLS.
J. Elisha Mitchell Sci. Soc. 53, 293-7 (1937); C.A. 32, 2648 (1938).

Peanut hulls were destructively dstd. and the distn. products examd. to det. how they differed from the products of wood distn. Acetone, Et Pr ketone, Me Bu ketone, formic acid, acetic acid, EtOH and butyric acid esters were identified in the distillate. MeOH, allyl alc. and sec. Bu alc. were probably also present. The gases from the distn. were inflammable and contained CO, CO_2, H_2 and light org. compds. The liquid distillate was miscible with H_2O but the semi-solid portion of the distillate was not. The C residue was finely divided and was readily ground so fine that colloidal solns. of C could be formed from it. The products of this distn. are very similar to those obtained by the destructive distn. of wood.

Hussey, R. E., Row, S. B. and Allison, W. W.
FUEL FROM SEWAGE AND CELLULOSIC WASTE.
Virginia Eng. Expt. Sta., Bull. 18, 50 pp. (1934); U.S. Pub. Health Eng. Abstracts 16, S, 83 (Oct. 10, 1936); C.A. 32, 1831 (1938).

It was found by controlled expts. made at the Va. Polytechnic Institute that sewage digestion at 25° produced 9.3 cu. ft. of gas, or 6 cu. ft. of CH_4 per lb. of dry suspended solids. By adding 17.2% waste paper (cellulose), the gas production from the sewage could be increased by 10 cu. ft. or 5.2 cu. ft. of CH_4 per lb. of paper. The addn. of peanut hulls to the sewage in the digestion tank produced 1.5 cu. ft. of gas or 0.58 cu. ft. of CH_4 per lb.

Kryz, Ferdinand
COLOR REACTIONS OF THE COLORING MATTER IN PEANUT AND HAZLENUT SHELLS.
Oesterr. Chem.-Ztg. 25, 95-6 (1922); C.A. 16, 3680 (1922).

Hot H_2O exts. the coloring matter from the shells of both nuts, as do abs. alc., amyl alc., ether, and benzine. In the cold concd. HCl or H_2SO_4 does not change the color of the soln. but on boiling it becomes red; while heating with concd. HNO_3 produces a yellow color and a yellow ppt. Heating with concd. alk. solns. or NH_3 gives a ruby-red coloration. With hot K_2CrO_4 the color becomes dark red; with hot $K_2Cr_2O_7$ a reddish brown ppt. forms. A hot $K_4Fe(CN)_6$ soln. added to the soln. of the coloring matter produces a yellowish green ppt. and $CuSO_4$ and $FeSO_4$ solns. give yellowish and olive-green ppts., resp. Heating with $FeCl_3$ soln. produces a reddish brown ppt., $AgNO_3$ gives a brown ppt. and $(NH_4)_2S_2O_8$ gives a light yellow ppt. A soln. of tannin produces a light yellow color in the coloring matter and $(AcO)_2Pb$ gives a reddish gray ppt. which, when filtered off, leaves a colorless filtrate. A soln. of $NaHSO_4$ decolorizes the soln. of coloring matter without producing a ppt.

Lynch, D. F. J.
THE PEANUT INDUSTRY. V. PEANUT BY-PRODUCTS.
J. Chem. Education 7, 1859-68(1930); C. A. 24, 4341 (1930).

Lynch, D. F. J. and Goss, Marshall J.
PEANUT-HULL CELLULOSE.
Ind. Eng. Chem. 22, 903-7 (1930); C.A. 24, 4928 (1930).
Peanut hulls were pulped in yields of 41 to 49% by the soda, sulfate and neutral sulfite processes, the latter being the most suitable. The pulps contained about 90% a-cellulose. Approx. 70,000 tons of hulls are available annually.

Marotta, D. and Calò, A.
THE EXTRACTION AND COMPOSITION OF THE ORGANIC PHOSPHOROUS COMPOUNDS FROM RICE POLISHINGS AND OIL-SEED HULLS.
Ann. chim. applicata 22, 763-76(1932); C.A. 27, 2461(1933).
The P, Ca and Mg contents of the org. P salts extd. from polishings and hulls of the following seeds, were, resp.: rice 19.5, 2.20, 11.22; peanut 14.6, 6.93, 6.27; sesame 18.10, 2.83, 9.78; cacao 18.59, 8.62, 7.53; soy bean 18.05, 9.53, 6.15; sunflower 18.00, 7.78, 7.11; rape 17.63, 9.61, 6.72; corn 20.00, 2.33, 9.70; in Ciba phytin 21.95, 11.50, 1.65%. The compns. of the compds., especially the Ca and Mg contents, therefore vary with the source. Double salts of Ca and Mg may be present in varying proportions.

Martin, Roger
SOLUTION OF THE PROBLEM OF THE UTILIZATION OF PEANUT HULLS AS FUEL.
Bull. mat. grasses inst. colonial Marseille 16, 109-16(1932); C.A. 26, 3899(1932).
A detailed account of the problems presented in the foregoing abstract is made. Two complete sets of data are given leading to a heat balance of the installation. The analysis of the ash retained on the grate is: loss 0.53, SiO_2 35.83, Al_2O_3 36.86, Fe_2O_3 1.34, CaO 17.30, SO_3 0.55, MgO 3.61, alkalies 3.98%. The ultimate analysis of the hull is: moisture 9.11, ash 1.51, C 32.27, H 4.49, O, N and S 52.62%. The thermal balance is divided so that the heat lost in the gases is 15.0%, that in the unburnt solids is 0.0%, that due to radiation is 6.0% and the useful heat is 79.0%.

Ramarao, G.
THE RECOVERY AND USE OF AGRICULTURAL WASTES. I.
Ind. & News Ed. J. Indian Chem. Soc. 1, 137-40(1938).: C.A. 33, 3563(1939).
A ton of ground nut shells on an av. yields 7400 cu. ft. of gas of a heating value equiv. to one and one-third cwt. of the local coal, 42 lb. of AcOH, 13 lb. of MeOH, 200 lb. of tar, and 740 lb. of charcoal.

Yanovsky, E.

EXTRACTION OF HEMICELLULOSES FROM PLANT MATERIALS.

Ind. Eng. Chem. 31, 95-100 (1939).: C.A. 33, 1492(1939).

Hemicelluloses from sugar-beet pulp, rice hulls and peanut shells were extd. by means of HCl, H_2SO_4 and NaOH of various concns. at 50°, 80° and 100°. With rice hulls and peanut shells normal extn. curves were obtained. The curves of sugar-beet pulp, however, showed with alkali and acids peculiar breaks which might be caused by the presence of pectin. The amt. removed by the extns. was detd. by the difference in wt. before and after hydrolysis. The filtrates were not further investigated. In the residues the pentosans were detd. and computed to the original wt. of the sample and in this way the amt. of pentosans extd. was calcd.

Anon.

CULTIVATION, PREPARATION AND UTILIZATION OF THE GROUNDNUT.
Bull. Imp. Inst., 8, 153-72; C.A. 5, 594 (1911).

An article discussing the following topics: cultivation, soil, manures, sowing, harvesting, picking, yield, varieties, disease and pests, utilization, prep. of the oil, characters of the oil, groundnut cake, groundnut hay.

Anon.

LEGUMINOUS HAYS.
J. Dept. Agr. Union S. Africa 8, 272 (1924); C.A. 18, 2395 (1924).

A table is given showing the % of water, crude protein, carbohydrates, crude fat, crude fiber and ash in lucerne, cowpea, velvet-bean, soy-bean and peanut hays produced in S. Africa.

Anon.

WORLD PEANUT PRODUCTION.

The world production on peanuts reached its high point with 8,740,000 tons in 1933 and constituted about a fifth of the production of all oilseeds. In the following years their cultivation declined, especially in India and China, owing to considerable collapse of prices, but is at present again ascending. 85 percent of the total peanut production falls on India, China, French West Africa, and the United States, of which 70 percent falls alone on India and China.

Adamson, Sir Harvey

THE MATERIAL RESOURCES OF BURMA.
Bull. Imp. Inst. 16, 40-79 (1918); C.A. 12, 2667 (1918).

Statements as to the production of rice, sesamum, millet, beans, groundnut , cotton, maize, wheat, sugar, tobacco, and rubber are given. Mineral deposits and fuels are also described in a general way.

Angoulvant.

PEANUT AND PALM OIL IN WEST AFRICA.
Bull. matieres grasses 1919, 3-16; C.A. 13, 3030 (1919).

Discussion relating to the production of these fats.

Bailey, H. S.

SOME AMERICAN VEGETABLE FOOD OILS. THEIR SOURCE AND METHODS OF PRODUCTION.
U. S. Department of Agr., Year Book, 1916, Separate 691, 18 pp: C.A. 11, 1700 (1917).

A description, in popular style, of the production, methods of pressing, and refining for food purposes, of olive, cottonseed, peanut, ans corn oils. Only low-grade olive oils are refined, and the finest quality peanut oil is that produced by cold-pressing prime, shelled, nuts. All cottonseed oil is refined, and much of it bleached and deodorized before being sold for edible purposes. Corn oil may be made from either the wet or dry process germ; that derived from the latter material is much more readily refined.

Buchner

CONCERNING PEANUT OIL.

Buchn. Rep. Bd. XLVIII. p. 244-253; C 1848, 123.

(Abstract translated from the German by J. R. Loeb and N. J. Morris).

According to a report given by A. Ostermeier sometime ago a considerable quantity of peanuts came from Singapore to Bremen. As they found no immediate buyer the importer had them worked up into oil. The price of this oil is at present 30 guilder per 100 pounds. The peanuts yield about 50% of this oil. Buchner gives the following notice concerning a sample of this oil. The American ground pea, peanut, earthnut, Mandubi-bean (Arachis hypogaea. Linn.) is an annual plant belonging to the family Leguminosae Caesalpiniaceae, which has some similarity to vetch. It is indigenous to tropical America. From there, however, it has been transplanted to Asia and Africa, even to Southern Europe. In the hot regions it is cultivated on account of its utility. Fr the root, extending from its base horizontally, rise several herbaceous stems taking root at the node, which sprout very many upright branches. The leaf stalks are delicate haired, 2-4 inches long, and have two paired, inverted egg-shaped or nearly oval leaflets from 7-14 lines (0.58-1.17 inches) long. The yellow flowers stand 2-6 on short delicate hair stems in the leaf angles. The fruit is a net-veined yellowish gray pod, 1-3 inches long and 4-9 lines (0.33-0.75 inches) thick and contains 2 or 3 brownish red seed about the size of a hazelnut. These are egg-shaped or truncated obliquely, the parenchyma itself is white and very nutritious, oily. The taste of the seed is sweet, somewhat waxlike. One enjoys them partly raw, partly prepared, and a chocolate variety prepared from them. The pressed peanut oil is used in the household, in the pharmacy and in the perfumery like almond oil. Payen and Henry in 1825 undertook a study of the seed from Arachis hypogaea, which were cultivated in France experimentally. They found 47% oil in them. A single plant produced about 700 fruit. Briole, professor of Botany at Novara, wrote in 1810 a treatise on the peanut and showed in it that the plant thrives very well in Italy, that the seeds contain about 50% of a mild fatty oil, which is little different from fine olive oil and that it leaves behind in the pressing a starch rich oil cake, which can be used for food, even for chocolate. According to Henry and Payen the seeds are rich in nutritious sulphur-containing plant-casein which can be coagulated by acetic acid. Moreover these chemists found crystallizable sugar, calcium phosphate and calcium malate, potassium chloride, and vegetable fiber, all of which constituents were also found in sweet almonds. Starch was found only in small amounts. According to the same chemists the peanut oil has a slight greenish color, a specific gravity of 0.9163 at 20°. It is almost insoluble in alcohol, is however dissolved readily by ether. It freezes about 3-4° below 0 to a white mass. According to Pou t this oil cna be easily differentiated from olive oil by the following test: the peanut oil on being ground together with nitrate of mercury does not become solid like the other. Yet after several days a white granulated substance separates. If the peanut oil is pressed cold it saponifies in the treatment with caustic soda in the cold slower than the warm pressed oil. The peanut oil soap is very white and without any extraneous odor. Soap manufactured from warm pressed oil smells unpleasant, is more colored than that of almond oil. Cold pressed peanut oil does not become rancid in the air as soon as almond oil.

Buchner states the following concerning the oil received from Bremen which appeared to be warm pressed. The oil has the color of province oil with a green iridescence. It is somewhat more mobile than olive oil. At ordinary temperatures the peanut oil has no marked odor, warmed to 40-60° it assumes however an odor similar to the province oil which is not unpleasant and not rancid. The taste is less sweet and agreeable than that of almond & olive oil, however, this oil was pressed from seed already some years old. A sample of peanut oil, which was exposed for 30 days on a heated room stove to a temperature ranging from 16-50° R (20-62.5° C.) remained odorless, neutral and not dried. With a temperature of + 1 to 3° R (1-4° C.) the oil becomes like a thick liniment, however in it margarin does not separate out in grains. Hereby it is differentiated at once from almond oil and olive oil. In the test with alcohol the first drops of oil which fall in 90% alcohol warmed to 40° R (50° C.) dissolve almost completely. In case the temperature of the oil saturated solution drops in the cooling, a part of the oil again separates. An ounce of 90% alcohol at 40° R (50° C.) dissolves 9 grains and at 16° R (20° C.) 5 grains of peanut oil. One part of oil is soluble at ordinary temperatures in 96-100 parts whereas at 40° R (50° C.) in 53-54 parts of alcohol of that strength.

Büning, H.

ENRICHING MILK AND CREAM WITH PEANUT OIL OR SESAME OIL.

Brit. 299, 617, Nov. 7, 1929; C.A. 23, p 3280 (1929).

The oil is "hardened to 32°" and homogenized with the milk or cream under 50-175 atm. pressure.

Croxton, F. E.

PEANUTS, PEANUT OIL AND PEANUT BUTTER.

Am. Food J. 22, 134-5 (1927); C.A. 21, 2036 (1927).

Statistical.

DeBelsunce, G.

PRODUCTION OF ALCOHOL, ACETIC ACID AND OTHER BYPRODUCTS FROM PEANUT HULLS BY THE MEUNIER PROCESS.

Bull. mat. grasses 1926, 1-3; C.A. 20, 2230 (1926).

Treatment of 8 kg. of peanut hulls with 7 kg. of dil. H_2SO_4 (strength not given) by the Meunier process (C.A. 16, 1664) gave the following percentages of decompn. products after 30 and 60 min., resp.: reducing sugars (completely fermentable) 21.80, 15.80; AcOH 2.26, 4.38; furfural 2.42, 2.66; Me_2CO 0.155, 0.47; other Et_2O-sol. products 0.755, 1.68. The solid residue, consisting essentially of lignin, can be used as fuel and is claimed to be sufficient to furnish all the heat required by the process. The merits of the process are briefly outlined.

Dunn, B. W.

REPORT OF CHIEF INSPECTOR, BUREAU FOR SAFE TRANSPORTATION OF EXPLOSIVES AND OTHER DANGEROUS ARTICLES.

Mar. 1, 1921. 75 pp. C.A. 15, 2356 (1921); Cf. C.A. 14, 1756; 15, 756.

The number of accidents from these substances in railroad transportation during 1920 was 1977, causing 3 deaths, 86 injuries and a loss of $1,090,806. The number of accidents was the greatest since these repts. began in 1910 but the number killed and the monetary loss the least since 1914. The largest number of accidents was from acids

and corrosive liquids, the largest loss, $595,705, from inflammable liquids. A comparison of total production in tons with loss per ton in value is begun and the data for 1918, '19 and '20 are given for black powder, high explosives, charcoal, gasoline, matches and HNO_3 as representing the most dangerous articles. The average for the 3 yrs. of loss per ton is HNO_3 $2,297, matches 0.5373, gunpowder 0.143, charcoal 0.0657, gasoline 0.0537 and high explosives 0.0112. The figs. for all explosives in the table are for normal production. If, in 1918, the war production were included, the total would be about 1,000,000 tons and the loss $0.026 per ton. During 1920 much attention has been given to the acid carboy test and a committee, representing makers of acid, makers of carboys and the Bur. of Explosives is engaged in standardizing the dropping test and pendulum impact test. The heaviest loss from tank cars is chargeable to the bottom outlet valve. One prolific source of leakage has been disposed of in the prohibition of extensions and supplementary valves extending below the level of the outlet valve cap. Leakage of HCl from wooden tanks has led to formation of a committee of acid shippers with the Bur. of Explosives to experiment with glass and rubber linings for both steel and wood tanks and to obtain a standard HCl car. Experience with poisonous liquids and gases and other poisonous articles necessitated a revision of freight and express regulations including shipping-container specifications. A tabular list of fires and losses from matches shows that (1) fiberboard containers are supplementing wooden ones; (2) in proportion to vol. of shipments in fiberboard these cause more fires and greater total losses; (3) the loss per fire is less for fiberboard packages as they are more nearly air-tight than wooden containers and this tends to smother a fire. The report of Charles P. Beistle, chief chemist, gives statistics of investigation of action of mixed acids on steel and finds that, to prevent excessive corrosion of tank cars, steel drums or similar shipping containers, mixts. of H_2SO_4 + HNO_3 should contain not less than 10% of H_2SO_4. Investigations of fires from pulverized coal or foundry facings developed a coal from Colorado so active that it ignited spontaneously in lots as small as 100 lbs. It carried an exceptionally high percentage of volatile org. matter. Peanut skins or bran, consisting of the membrane coating the meat of the nut, having caused fires investigation showed this due to impregnation with natural oil from the meat and it is proposed that peanut bran contg. more than 12% of oil shall be a prohibited article in the revised regulations. Varnished paper is found to cause fires unless shipped in long and tightly rolled strips. It, and varnished cloth, are frequently cut in small pieces such as disks, gaskets or washers and these heat. Sulfur chloride although shipped in steel containers was found rapidly to corrode steel especially with increased temp. P_2O_5 was found to heat up by contact with moisture sufficiently to cause ignition of adjacent combustible material. The coefficient of expansion was detd. for 9 vegetable and animal oils commonly occurring in commerce and it was concluded that there should be an outage of approx. 2% in shipping containers. Sodium picramate contg. 15.5% H_2O was readily ignited by spark or flame but was only ignited and not detonated by a No. 6 elec. detonator. At a temp. of 295-300° it exploded with considerable violence. After 72 hrs. at 75° it gave no evidence of decompn. It is considered unsafe for transportation unless contg. 20% of water. The rept. of the Test and Specification Dept. by G. E. Carleton is of value to chemists.

Fajardo, Abelardo J.

A STUDY OF PEANUT AND INDIGOFERRA HENDECAPHYLLA JACQ. AS FORAGE CROPS.
Philippine Agr. 23, 140-55 (1934); C.A.28, 6877 (1934).

The compn. of 3 varieties of green peanut forage varies as follows: moisture 64.7-68.0, ash 2.4-3.7, crude protein 3.0-5.3, crude fiber 7.2-10.1, N-free ext. 16.3-18.6, fat 0.3-0.5% and food value 900-940 cal. per kg. Corresponding values for sun-dried peanut hay are 13.2-14.5, 7.0-7.7, 12.9-14.9, 19.0-23.1, 41.0-43.6, 1.7-2.1% and 2400-2530 cal. per kg. Similar detns. for Indigoferra and data on the palatability and nutritive value are given for all these feeds.

Flint, P. N.

SPANISH PEANUTS, SOY BEANS, AND SKIM MILK AS FEEDS SUPPLEMENTARY TO CORN.
Ga. Agr. Expt. Sta., Bull. 87; C.A. 4, 1783 (1910).

Pigs about 3 months of age fed on corn and shorts for 31 days and then on corn alone for 48 days made an av. daily gain of 0.71 lb. per head at a cost of 8.3 cts. per lb. Another lot on shelled corn and skim milk made a gain of 0.96 lb. per head per day at a cost of 6.8 cts. per lb. The daily gain per head on corn and fresh soy beans was 0.7 lb. at a cost of 5.6 cts. per lb., and on a ration of corn and fresh Spanish peanuts 0.9 lb. per head per day at a cost of 4.6 per lb.

Haag, W. Odrich

OIL SEEDS AND OILS IN DUTCH EAST INDIES.
Seifenfabr. 39, 125-6, 148-50, 177-8, 203-4 (1919); C.A. 13, 2769 (1919).

A collection of statistics of production and export from Dutch Indies of copra, peanuts, kapok, castor beans and sesame and a historical, economic account of the growth of these industries which center around the island of Java. Some individual data on 14 oil factories, now in existence, are given together with a few statistics on the oleomargarine and soap industries.

Hartley, B. J.

GROUNDNUTS AND THEIR CULTIVATION.
East African Agr. J. 1, 501-11 (1936); C.A. 30, 6468 (1936).

Groundnut vines, collected from native fields in Tanganyika, contained crude protein 7.70, true protein 6.95, ether ext. 1.05%, N-free ext. 49.54, crude fiber 31.73, total ash 9.90, SiO_2 5.63, CaO 0.75 and P_2O_5 0.51%. The digestible nutrients were crude protein 3.83, ether ext. 0.32, N-free ext. 39.16, crude fiber 14.63 and org. matter 57.94% and starch equiv.(chaffed vines) 46.80. The vines included a fair proportion of roots while a considerable amt. of leaf was lost in handling.

King, Florence B, Loughlin, Rosemary, Riemenschneider, R. W., and Ellis, N. R.
THE RELATIVE VALUES OF VARIOUS LARDS AND OTHER FATS FOR THE DEEP FAT FRYING OF POTATO CHIPS.
J. Agr. Research 53, 369-81 (1936); C.A. 31, 1507 (1937).

Nine fats including 3 kettle-rendered lards from animals fed on rations consisting largely of peanut, corn and brewer's rice, a standard prime steam lard, a hydrogenated lard, a hydrogenated cottonseed oil and 3 highly refined oils from corn, cotton seed and peanuts, resp., were studied for use in the frying of potato chips. The fat absorption in the potato chips was about the same for all the fats used. After 10 fryings none of the fats had a high free fatty acid content but the peroxide values were high enough, especially with the lards, to make their fitness for further use questionable. The percentage of free fatty acids in the fat extd. from the chips was greater than in the frying fat. The palatability tests showed that the oils were preferable for frying to the lards. Peanut oil was judged to impart the most desirable flavor to the chips with cottonseed oil ranking next to peanut oil. Of the lards, peanut and hydrogenated were the best for frying chips. The slight differences between the desirability of prime steam, corn and rice lards for frying were not significant. Potato chips fried in oils and in most cases those stored in the refrigerator kept fresh for the longest period.

Menon, A. K., Calicut, India.
GROUNDNUT AND ITS USES.
Kerala Soap Inst. 18 pp. 2 annas; C.A. 27, 2833 (1933).

Michot-Dupont, F.
FUELS OBTAINED BY THE DESTRUCTIVE DISTILLATION OF CRUDE OIL. SEEDS.
Bull. assoc. chim. 54, 438-48 (1937); C.A. 31, 4787 (1937).

Slow heating of peanuts in closed retorts to 450° gave in lab. expts. 22.75% oil, 36.35% coke and 223 l. of gas per kg. of nuts. On a small plant scale the yield of oil was 39.3%, and of coke 20.2%. The gas consisted of 35% CH_4, 25% other satd. hydrocarbons, 10% olefins, 13% H, 6% CO, 6% CO_2 and 5% N. The yield of oil is increased by adding alkali to the raw material. The oil gives upon fractionation products similar to those obtained from mineral oils, but of smaller fuel value. About 23% of tar is obtained which is similar to that from lignite, contg. benzene and toluene in the lower fraction, esters in the middle fraction and free fat acids in the higher fraction. The distn. of other oil seeds gave similar results.

Saito, Kenkichi.
THE EFFECT OF CASTOR, PEANUT, SESAME AND LINSEED OILS ON FIBROBLAST CULTURES.
Folia Pharmacol. Japon. 23, 1-5 (Breviaria 1) (1936); C.A. 30, 8390 (1936).

These oils in gum arabic emulsion in low concn. showed no effect on the growth of fibroblast, but in higher concn. inhibited the growth. Castor oil was the most toxic. The effect of sandalwood, turpentine, copaiba and juniper oils on the growth of fibroblast cultures. Ibid. 6-10 (Breviaria 1)(1936).- The effects of these oils were similar to those mentioned above. Sandalwood oil was the most toxic.

Sen, J. N.
COMPOSITION OF SOME INDIAN FEEDING STUFFS.
Agr. Research Inst. Pusa, Bull. 70, 1-60 (1917); C.A. 12, 2393 (1918).
Analyses of a large number of samples taken from different yrs. were run on Indian gum arabic, peanuts, oats, mohua, Indian colza, Indian mustard, Indian rape, pigeon pea, tea seed, safflower, chick peas, coconut, Job's tears, cooked food, sunn hemp, long and round zedoary, cluster bean, Karen potato, horse-gram, val marua, rocket, buckwheat, soy bean, cottonseed, grass and hay, sunflower, barley, sweet potato, chickling-vetch, lentil, linseed, alfalfa, senzi, rice, poor man's millet, guinea grass, common millet, little millet, poppy, kodo millet, spiked millet, aconite-leaved kidney bean, lima bean, urid, green gram, field pea, garden pea, castor, sugar cane, sesame, Italian millet, silage, Indian millet, sugar sorghum, Egyptian clover, Persian clover, wheat, common vetch, cow pea, maize, and ginger. The results are given in a series of tables.

Sulzberger, N.
IMPROVING THE FLAVOR OF COTTONSEED OIL.
U. S., 1,127,545, Feb. 9, C.A. 9, P829 (1915).
Improving the flavor of cottonseed oil by adding to it about 3% of peanut oil.

Sulzberger, N.
FLAVORING COTTONSEED OIL, PEANUT OIL, BUTTER OR BUTTERINE.
U. S., 1,140,629, May 25; C.A. 9, P1813 (1915).
Flavoring cottonseed oil, peanut oil, butter or butterine by heating for several hrs. at 50-60° with hay or clover (previously dried at 110°) to impregnate it with the aromatic constituents of the latter. Cf. C.A. 9, 829.

Tarantino, G. B.
CATTLE FEEDING IN THE ITALIAN SOMALILAND.
Rass. econ. colonie (Italy) 22, 97-109 (1934); C.A. 28, 6496 (1934).
The av. compns. are given of the following substances used as fodder for cattle: green plants of dhurra (sorghum): N-contg. matter 2.0, fats 5.0, raw proteins 10.0, ash 1.5, N-free ext. 8.0%; manioc tubers: H_2O 14.75, proteins 6.5, starch 45.6, cellulose 7.4, ash 5.5, sol. matter 20.3%; maize: dry matter 19.5, protein 1.0, N-free ext. 8.0, ash 1.5%; peanut straw: org. matter 82.15, N-free ext. 30.0, protein 40.0%; tops of sugar cane: H_2O 78.3 , protein 1.1, N-free ext. 9.6, fats 0.3, cellulose 7.1, sugars 2.0, ash 1.5%.

Thompson, H. C. and Bailey, H. S.
PEANUT OIL.
U. S. Dept. Agr., Farmers' Bull. 751, 16 pp. (1916); C.A. 11, 1495 (1917).
The authors give the following summary: "(1) Peanut oil is one of the most important of the world's food oils. (2) The U. S. imported during the yr. ended June 30, 1914, 1,332,108 gal. of peanut oil, valued at $915,939. (3) In making high-grade edible oils in Europe the peanuts are cleaned, shelled, blanched, and degermed before being pressed. The first pressing is made without heating the material. After the first pressing the cake is reground and heated for the second pressing; 3 pressings are usually made, and in

some mills a fourth. (4) In Europe the best grades of peanut oil are used for edible purposes. The second-grade oil is used largely in the manuf. of margarines. (5) Of the 5 varieties of peanuts grown in the U. S., but one variety (the Spanish) should be grown for oil purposes. (6) In order to make a very high-grade edible oil the peanuts should be thoroughly cleaned, shelled, blanched, and degermed before being pressed. (7) When using a hydraulic press for expressing peanut oil the cleaned meats are ground and rolled in order to crush the oil cells. In the expeller type of machine the grinding is not necessary. (8) To make a high-grade peanut oil in a cottonseed-oil mill it will be necessary to install additional machinery. The equipment used in peanut cleaning and shelling factories could be used to advantage. (9) Expts. made in cottonseed-oil mills in this country show that the presses now in use can be used for making peanut oil. (10) The first pressing should be made cold, in order to get a high-grade edible oil which will not need refining. The second pressing should be made after regrinding and heating the cake from the first pressing. It is doubtful whether more than 2 pressings should be made in this country. (11) The oil from the first pressing should be a high-grade edible oil. The oil from the second pressing might be refined and used for cooking or for the manuf. of oleomargarine, or it might be used without refining for soap making. (12) The analyses of a large no. of miscellaneous samples of Va. and Spanish peanuts show a difference in favor of the latter of about 9% in oil content. However, the analyses of the 5 varieties grown under the same conditions show very little difference in the percentage of oil. (13) Peanut meal, a valuable byproduct of oil manuf., is a highly nutritious stock feed. (14) Under present conditions oil mills cannot afford to pay more than 70 cts. ber bu. for peanuts to be used in making oil. Under normal conditions they could not afford to pay as much as this unless a higher grade oil is made than is being made at the present time. (15) The av. cost of production of peanuts is $20 to $25 for a yield of 35 bu. per acre. At 70 cts. a bu. for the peanuts and $12 a ton for the hay the gross returns would be $32.50. (16) At 70 cts. a bu. for Spanish peanuts the oil must sell for 60 to 65 cts. per gal. in order to make a profit, figured on the basis of 80 gal. of oil per ton of peanuts. (17) Peanut oil and peanut meal should be correctly labeled and advertised for just what they are."

AUTHOR INDEX

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SUBJECT INDEX